[A] : Choose The Correct Answer : -

1	If $x^4 + 64$ can be factorized by completing the square by adding the term .... and its additive inverse. (a) $8x^2$ (b) $16x^2$ (c) $64x^2$ (d) $8x^4$
2	$x^4 + 4 = (x^2 + 2)^2 -$ .... (a) $-2x^2$ (b) $4x^2$ (c) $2x^2$ (d) $4x^4$
3	If $5x = 35$, then $2x + 1 =$ .... (a) 7 (b) 8 (c) 15 (d) 71
4	If $\frac{1}{2}x = 4$, then $2x =$ .... (a) $\frac{1}{16}$ (b) 4 (c) 8 (d) 16
5	If $\frac{3}{18} = \frac{x}{54}$, then $x =$ .... (a) 3 (b) 9 (c) 6 (d) 18
6	The S.S of the equation : $x^2 + 4 = 0$, $x \in \mathbb{Q}$ is .... (a) $\{2\}$ (b) $\{-2\}$ (c) $\{-2, 2\}$ (d) $\varnothing$
7	The S.S. of the equation : $x^2 = 9$ in $\mathbb{N}$ is .... (a) $\{\varnothing\}$ (b) $\{-3\}$ (c) $\{3\}$ (d) $\{3, -3\}$
8	The solution set of the equation : $x^2 - 25 = 0$ in $\mathbb{R}$ is .... (a) $\varnothing$ (b) $\{5\}$ (c) $\{5, -5\}$ (d) $\{25\}$
9	The S.S. of the equation : $x(x - 2) = 0$ in $\mathbb{R}$ is .... (a) $\{0\}$ (b) $\{2\}$ (c) $\{0, 2\}$ (d) $\{0, -2\}$
10	The solution set of the equation : $(x + 2)(x - 5) = 0$ in $\mathbb{R}$ is .... (a) $\{-2\}$ (b) $\{-2, 5\}$ (c) $\{0, 5\}$ (d) $\{2, -5\}$

11	The S.S. of the equation : $x^2 - x = 0$ is ……… (a) $\{0\}$ (b) $\varnothing$ (c) $\{0, 1\}$ (d) $\{1\}$
12	The S.S. of the equation : $x^2 - \sqrt{3}\, x = 0$ in $\mathbb{R}$ is ……… (a) $\{0, \sqrt{3}\}$ (b) $\{0, -\sqrt{3}\}$ (c) $\{0\}$ (d) $\{\sqrt{3}\}$
13	The S.S. of the equation in $\mathbb{R}$: $x^2 + 4x + 4 = 0$ is …………… (a) $\{2, -2\}$ (b) $\{2\}$ (c) $\{-2\}$ (d) $\{4, 2\}$
14	If $(x + 1)^2 = 1$, then $x \in$ ……… (a) $\{0, 2\}$ (b) $\{0, -2\}$ (c) $\{0\}$ (d) $\varnothing$
15	If 2 is the solution of : $x^2 - 5x + \ell = 0$, then ℓ = …………… (a) -3 (b) -6 (c) 3 (d) 6
16	If Malak age now is x years, then his age after 5 years will be ……… years. (a) $x + 5$ (b) $x - 5$ (c) $5x$ (d) $5 \div x$
17	If the age of Zyad now is x years, then his age 5 years ago is …………… years. (a) $5x$ (b) $5 - x$ (c) $x - 5$ (d) $x + 5$
18	If four times a number is 48, then one third of this number is …………… (a) 4 (b) 8 (c) 12 (d) 9
19	$5^3 + 5^3 + 5^3 + 5^3 + 5^3 =$ ……… (a) 5^4 (b) 5^{12} (c) 20^3 (d) 20^{12}
20	If : $x = \frac{\sqrt{9}}{\sqrt{3}}$, then x^{-1} = …………… (a) $\frac{\sqrt{3}}{3}$ (b) $\frac{\sqrt{3}}{2}$ (c) $\sqrt{3}$ (d) 2
21	One seventh of : $7^{10} \times 1^{10}$ = …………… (a) 7^{20} (b) 7^{9} (c) 7^{19} (d) 7^{10}

22	One sixth of $(2^{12} \times 3^{12})$ is .... (a) 6^2 (b) 6^4 (c) 6^{11} (d) 6^{23}
23	$2^4 + \left(\sqrt{2}\right)^8 =$ .... (a) 2^5 (b) 2^4 (c) 2^6 (d) 2^8
24	$2^2 \times 5^3 =$ .... (a) $\frac{1}{2} \times 10^3$ (b) 10^3 (c) 10^5 (d) 10^6
25	$2^{20} + 2^{21} =$ .... (a) 2×2^{40} (b) 2×2^{41} (c) 3×2^{21} (d) 3×2^{20}
26	If : $3^{x} \times 2^{-x} = \frac{3}{2}$, then $x =$ .... (a) 3 (b) 1 (c) 2 (d) 1.5
27	If : $2^{x} = 8$, then $x =$ .... (a) 0 (b) 1 (c) 2 (d) 3
28	If : $2^{x} = 3$, then $8^{x} =$ .... (a) 9 (b) 6 (c) 27 (d) 24
29	If $3^{x-4} = 1$, then $x =$ .... (a) 1 (b) 4 (c) 3 (d) zero
30	If : $3^{x} = 7$, then $3^{x+1} =$ .... (a) $\frac{3}{7}$ (b) 21 (c) 9 (d) $\frac{7}{3}$
31	If : $5^{x} = 4$, then $5^{x-1} =$ .... (a) 0.8 (b) 0.125 (c) 1.25 (d) 0.08
32	If $9^{8-2x} = 1$, then $x =$ .... (a) 0 (b) 4 (c) $\frac{1}{4}$ (d) 6

No.	Question
33	If : $(x-3)^{zero} = 1$, then $x \in$ .... (a) $\mathbb{R} - \{3\}$ (b) $\mathbb{R} - \{-3\}$ (c) $\{3\}$ (d) $\mathbb{R}$
34	The expression : $\frac{3^x \times 3^x \times 3^x}{3^x + 3^x + 3^x}$ equals .... (a) 3^{2x-1} (b) 3^{1-2x} (c) 3^{x^3-3x} (d) 3^{3x-x^3}
35	The expression $(5^{x+2} - 5^{x+1}) \div 5^x =$ .... (a) 5 (b) 10 (c) 15 (d) 20
36	The probability of any event A $\in$ .... (a) $[0 , 1]$ (b) $]0 , 1[$ (c) $[1 , \infty[$ (d) $]-1 , 1[$
37	The probability of a certain event = ... (a) 0 (b) 1 (c) 2 (d) 3
38	The probability of the impossible event = ... (a) 2 (b) -1 (c) 0 (d) 1
39	Which of the following may be equal the probability of an event ? (a) -0.73 (b) 1.23 (c) 79 % (d) $\frac{4}{3}$
40	A regular die is thrown and observed the upper face, then the probability of appearance a number divisible by 3 is .... (a) $\frac{1}{4}$ (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) $\frac{3}{4}$
41	If a dice is rolled once , the probability of appearing a number less than 4 is .... (a) $\frac{1}{6}$ (b) $\frac{1}{2}$ (c) $\frac{1}{4}$ (d) $\frac{2}{3}$
42	If a die is thrown once , then the probability of appearance number 7 is .... (a) zero (b) 0.7 (c) 0.6 (d) 1
43	A die is thrown once , then the probability of the appearance of an even number = ... (a) zero (b) $\frac{1}{6}$ (c) $\frac{1}{3}$ (d) $\frac{1}{2}$

44 A box contains a number of balls , half of them are white , one third of them are green and the rest are blue. If a ball is drawn at random , then the probability that the drawn ball is blue equals ....

(a) $\frac{1}{6}$ (b) $\frac{1}{4}$ (c) $\frac{1}{3}$ (d) $\frac{1}{2}$

45 A bag contains 9 similar cards labeled from 1 to 9 , a card is drawn at random , then the probability that this card carries an odd prime number is ....

(a) zero (b) $\frac{1}{9}$ (c) $\frac{4}{9}$ (d) $\frac{1}{3}$

46 A card is drawn randomly from a group of cards labeled from 1 to 10 then the probability that the card carries a number greater than or equal 7 is ....

(a) $\frac{3}{10}$ (b) $\frac{4}{10}$ (c) $\frac{6}{10}$ (d) $\frac{7}{10}$

47 In a mixed school there are 320 students. If the probability that the ideal student is a boy equals 0.6 , then the number of girls of the school equals ....

(a) 256 (b) 192 (c) 128 (d) 196

48 There are 21 boys and 15 girls in a classroom, one pupil is chosen randomly , the probability that the chosen pupil is a girl = ...

(a) $\frac{5}{12}$ (b) $\frac{7}{12}$ (c) $\frac{4}{7}$ (d) $\frac{5}{6}$

49 In a race between two players if the probability of winning of the first is 0.75 , then the probability of winning of the second is ....

(a) zero (b) 0.25 (c) 0.75 (d) 1

50 If the probability rate of student succeeds in a subject is 75 % then the fail probability of is failure is ....

(a) 0.025 (b) 0.25 (c) 2.5 (d) 25

51 A letter is selected randomly from the word (SCHOOL) , then the probability of selecting the letter O is ....

(a) $\frac{1}{6}$ (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) non

[B] : Complete the Following : -

1	$x(a+b) - y(a+b) = (\cdots\cdots)(x-y)$
2	If : $a+b=4$, $x+y=-3$, then $ax+bx+ay+by = \cdots\cdots$
3	$ax+ay+x+y=(x+y)(\cdots\cdots)$
4	If : $(x-2y+3z)=5$, then the numerical value of $(x+3z)(x-2y+3z)-2y(x-2y+3z)$ ………
5	The S.S. of the following equation : $(x^2+3)(x^3+1)=0$ in $\mathbb{R}$ is ………
6	The S.S. of the equation : $(x-1)(x-2)=0$ in $\mathbb{R}$ is {……… , ………}
7	The solution set of the equation : $x^2-1=8$, where $x \in \mathbb{Z}$ is ………
8	The S.S. of the equation : $x^2-3=0$ in $\mathbb{R}$ ………
9	The perimeter of a square is x cm. , then its area equals ……… cm^2
10	The perimeter of a square is $4x$ cm. , then its area equals ……… cm^2
11	If $x+\frac{1}{x}=5$, then $x^2+\frac{1}{x^2}=$ ………
12	$(a^2)^4 = a^{\cdots\cdots}$
13	$\sqrt[3]{8x^3} =$ ………
14	$\sqrt[3]{-125a^6} =$ ………
15	The greater number of $(-2)^{24}$ and $(-2)^{25}$ is ………
16	A die is thrown once , then the probability of appearance of odd prime number is ………

[C] : Essay Problems : -

No.	Problem
1	**Factorize each of the following completely :** $a x^2 + b x^2 - a y^2 - b y^2$ **2016 Exam (2) Question (5) (a)**
2	**Factorize each of the following completely :** $y^3 - y^2 + 9 y - 9$ **2016 Exam (12) Question (3)**
3	**Factorize each of the following completely :** $x^4 - x^2 - 5 x + 5$ **Model Exam (5) Question (3)**
4	If $(x + y) = 7$ and $(a - 2 b) = 4$ **, find the numerical value of :** $a (x + y) - 2 b (x + y)$ **2016 Exam (15) Question (4) (a)**
5	**Factorize each of the following completely :** $x^4 + 4 y^4$ **2014 Exam (3) Question (3) (a)**
6	**Factorize the expression :** $x^4 + x^2 y^2 + 25 y^4$ by completing the square. **2016 Exam (10) Question (4) (a)**
7	**Find the value of x if :** $x^3 = 8$ **2015 Exam (2) Question (3) (b)**
8	**Find in $\mathbb{R}$ the S.S. of the equation :** $6 x^2 - 7 x - 3 = 0$ **2016 Exam (2) Question (3) (b)**
9	**Find in $\mathbb{R}$ the solution set of :** $2 x^3 = 18 x$ **2015 Exam (11) Question (4) (a)**
10	**Solve in $\mathbb{R}$ the equation :** $3 x^2 + x = 4$ **2015 Exam (1) Question (4) (b)**
11	If : $x = \left(\sqrt{5} - 2\right)$ and $y = \left(\sqrt{5} + 2\right)$ **Find :** $(x + y)^4$ **2014 Exam (8) Question (5) (a)**
12	**Find the S.S. of the equation :** $\frac{x - 1}{7} = \frac{8}{x}$ in $\mathbb{R}$ **2014 Exam (10) Question (5) (b)**

13	If a real number is added to its square the result will be 12, find the number. **2016 Exam (14) Question (4) (b)**
14	The sum of the squares of consecutive even integers is 100 **Find the two numbers.** **2014 Exam (10) Question (3) (b)**
15	**Find the rational number whose square is more than 5 times the number by 36** **2014 Exam (13) Question (5) (a)**
16	Find the real number whose double is increased by 1 than its multiplicative inverse. **Model Exam (2) Question (5) (a)**
17	What is the real number if we subtract twice its multiplicative inverse from it , the result equal one ? **Model Exam (5) Question (4) (b)**
18	If the area of a rectangle is 35 cm^2 , and its length is 2 cm. more than its width , **Find the perimeter of the rectangle.** **2014 Exam (3) Question (4) (b)**
19	If : $\frac{2^{x} \times 9^{x+1}}{18^{x}} = 3^{x}$ Find the value of : x **2015 Exam (3) Question (4) (a)**
20	**Find in the simplest form :** $\frac{(\sqrt{2})^{5} \times (3)^{-2}}{3 \times (\sqrt{2})^{9}}$ **2014 Exam (13) Question (4) (b)**
21	If $2^{x-3} = 32$, **then find the value of :** x **2016 Exam (15) Question (4) (b)**
22	If : $3^{x-7} = 5^{0}$ **, find the value of :** x **2014 Exam (9) Question (5) (a)**
23	**Find in ℝ The S.S. of the equation :** $2^{x^2 - x} = 4$ **2014 Exam (2) Question (5) (b)**
24	If : $3^{x} = 5$, then : $3^{x+1} = \dots\dots\dots$

	2014 Exam (5) Question (5) (a)
25	If $2^{x} = 3$ and $5^{y} = 4$, **find the value of :** $8^{x} - 25^{y}$ 2016 Exam (1) Question (5) (b)
26	If : $3^{x} = 27$, and $4^{x+y} = 1$ calculate the value of x and y 2014 Exam (7) Question (5) (a)
27	**Find the value of x if :** $\left[\sqrt{\frac{3}{2}}\right]^{x-1} = \frac{4}{9}$ 2014 Exam (15) Question (5) (b)
28	Find the value of n if $\left(\sqrt{3}\right)^{n+2} = 9$ 2016 Exam (4) Question (5) (a)
29	If : $x = 2$, $y = \sqrt{3}$ **Find the value of :** $3\,(x - y)^2\,(x + y)^2$ 2014 Exam (10) Question (5) (a)
30	A box contains 12 red. , 18 white and 20 blue balls. A ball is drawn randomly from the box. **Calculate the probabilities of the following events :** (1) The ball is white. (2) The ball is not red. (3) The ball is red or blue. 2015 Exam (2) Question (5) (b)
31	A bag contains a number of similar balls , some of them are red , 4 green balls and 5 blue balls. If the probability of drawing a ball with green colour is $\frac{1}{3}$ Find the number of red balls. 2015 Exam (4) Question (5) (a)
32	A bag contains a number of similar balls , 10 of them are white and the rest are red. If the probability of drawing a red ball is $\frac{1}{3}$, find the number of all balls. 2016 Exam (1) Question (4) (b)
33	A bag contains a number of similar balls , 5 of them are white and the rest are red. If the probability of drawing a red ball is $\frac{2}{3}$, find the number of all the balls. Model Exam (1) Question (5) (a)

34

A bag contains a number of similar balls. Some of them are red, 2 greens , 4 blues. If the probability of drawing a ball with green color is $\frac{1}{6}$, find the number of red balls.

Model Exam (2) Question (5) (b)

35

A regular die is thrown once. Find the probability of each of the following events :

(1) Appearance a number divisible by 3

(2) Appearance a prime number less than 6

2016 Exam (8) Question (5) (b)

36

One card is selected randomly from 8 cards numbered from 1 to 8

Find the probability of the following events :

(1) Getting an even number.

(2) Getting a number divisible by 3

(3) Getting a number greater then or equal to 6

2016 Exam (9) Question (4) (a)

37

Selecting randomly a card out of 20 cards numbered from 1 to 20

Find the probability of getting card carries :

(1) An odd number.

(2) A perfect square number

2016 Exam (4) Question (5) (b)

38

A numbered card is selected randomly from a set of similar cards numbered from 1 to 24. **Find the probability of getting a card carries :**

(1) A multiple of 4

(2) A multiple of 6

(3) A multiple of 4 and 6 together.

(4) A multiple of 4 or 6

(5) A number divisible by 25

2016 Exam (10) Question (5) (b)

39

A team plays 30 matches in national league its drawn probability is 0.3 and its win probability is 0.6 Calculate the number of loss matches.

2015 Exam (3) Question (4) (b)

40

In the football league , the probability of a team to win is 0.6 and the probability to drew is 0.3 if the number of matches supposed to be played by that team is 30 matches. How many matches do you predict the team wins ?

How many matches do you predict the team loses ?

2014 Exam (3) Question (5) (b)

41

The set $\{2 , 3 , 4\}$ is used for writing a number which consists of two different digits.

Calculate the probability of each of the following events :

(1) The unit digit is even.

(2) The sum of the two digits is greater than 5

Model Exam (5) Question (5) (b)

42

From the set $\{2 , 3 , 4 , 5 , 6 , 7 , 8\}$ one number is chosen at random.

Calculate the probability of each of the following events :

(1) The number is even. (2) The number is divisible by 3

2016 Exam (6) Question (5) (b)

43

In the opposite figure , a spinner game which all its sectors are equal in area and numbered as shown in the figure. Find the probability the pointer stops at number 3

Model Exam (3) Question (5) (a)

44

The following table shwos the evaluation of 50 students in one month :

Estimate	Excellent	Very good	Good	Pass	Fial
Number of students	6	9	11	16	8

A student is chosen randomly, what is the probability of getting a score of :

(1) Excellent. (2) Less than very good.

2016 Exam (12) Question (5) (b)

45

In a mixed school, there are 230 students, if the probability that the ideal student is a boy equals 0.6 . Find the number of girls of the school.

2016 Exam (14) Question (5) (b)

Prep (2) – 2016 – Second Term

Algebra – Final Revision Solutions

[A] : Choose Problems Answer : -

1	B	18	A	35	D
2	B	19	A	36	A
3	C	20	A	37	B
4	D	21	B	38	C
5	B	22	C	39	C
6	D	23	A	40	B
7	D	24	A	41	B
8	C	25	D	42	A
9	C	26	B	43	D
10	B	27	D	44	C
11	C	28	C	45	B
12	A	29	B	46	B
13	C	30	B	47	C
14	C	31	A	48	A
15	D	32	B	49	B
16	A	33	A	50	B
17	C	34	A	51	B

[B] : Complete Problems Answer : -

Sn.	Answer	Sn.	Answer
1	a + b	9	$\frac{X^2}{16}$
2	- 12	10	X^2
3	a + 1	11	23
4	25	12	a^8
5	{ - 1 }	13	2 X
6	{ 1 , 2 }	14	$-5a^2$
7	{ - 3 , 3 }	15	$(-2)^{24}$
8	$\{\sqrt{3}, \sqrt{-3}\}$	16	$\frac{2}{6} = \frac{1}{3}$

[C] : Essay Problems Answer : -

1	(1) $x^2(a+b) - y^2(a+b) = (a+b)(x^2-y^2)$ $= (a+b)(x-y)(x+y)$ (2) $(x^2+2y^2)(x^2-2y^2)$
2	$y^2(y-1) + 9(y-1) = (y-1)(y^2+9)$
3	$x^2(x^2-1) - 5(x-1)$ $= x^2(x-1)(x+1) - 5(x-1)$ $= (x-1)\left(x^2(x+1)-5\right)$ $= (x-1)(x^3+x^2-5)$
4	$a(x+y) - 2b(x+y) = (x+y)(a-2b)$ $= 7 \times 4 = 28$
5	$x^4+4y^4 = x^4+4y^4+4x^2y^2-4x^2y^2$ $= (x^2+2y^2)^2 - 4x^2y^2$ $= (x^2+2y^2-2xy)(x^2+2y^2+2xy)$
6	$x^4+x^2y^2+25y^4+9x^2y^2-9x^2y^2$ $= x^4+10x^2y^2+25y^4-9x^2y^2$ $= (x^2+5y^2)^2 - 9x^2y^2$ $= (x^2+5y^2-3xy)(x^2+5y^2+3xy)$
7	$x^3 = 8$ $\therefore x^3 = 2^3$ $\therefore x = 2$
8	$\because 6x^2-7x-3=0$ $\therefore (3x+1)(2x-3)=0$ $\therefore 3x+1=0$ $\therefore x = -\frac{1}{3}$ or $2x-3=0$ $\therefore x = \frac{3}{2}$ $\therefore$ The S.S. $= \left\{-\frac{1}{3}, \frac{3}{2}\right\}$

9

$\because 2x^3 = 18x$ $\quad \therefore 2x^3 - 18x = 0$

$\therefore 2x(x^2 - 9) = 0$ $\quad \therefore 2x(x-3)(x+3) = 0$

$\therefore 2x = 0$ $\quad \therefore x = 0$

or $x - 3 = 0$ $\quad \therefore x = 3$

or $x + 3 = 0$ $\quad \therefore x = -3$

$\therefore$ The S.S. $= \{-3, 0, 3\}$

10

$\because 3x^2 + x = 4$ $\quad \therefore 3x^2 + x - 4 = 0$

$\therefore (3x+4)(x-1) = 0$

$\therefore 3x + 4 = 0$ $\quad \therefore x = -\frac{4}{3}$

or $x - 1 = 0$ $\quad \therefore x = 1$

11

$(x+y)^4 = [(\sqrt{5}-2)+(\sqrt{5}+2)]^4 = (2\sqrt{5})^4 = 400$

12

$\because \frac{x-1}{7} = \frac{8}{x}$ $\quad \therefore x(x-1) = 56$

$\therefore x^2 - x - 56 = 0$

$\therefore (x-8)(x+7) = 0$

$\therefore x - 8 = 0$ $\quad \therefore x = 8$

or $x + 7 = 0$ $\quad \therefore x = -7$

$\therefore$ The S.S. $= \{8, -7\}$

13

Let the number be x

$\therefore x^2 + x = 12$ $\quad \therefore x^2 + x - 12 = 0$

$\therefore (x-3)(x+4) = 0$ $\quad \therefore x - 3 = 0$ $\quad \therefore x = 3$

or $x + 4 = 0$ $\quad \therefore x = -4$

$\therefore$ The number is : 3 or -4

14

Let the two numbers be : x and $x + 2$

$\therefore x^2 + (x+2)^2 = 100$

$\therefore x^2 + x^2 + 4x + 4 - 100 = 0$

$\therefore 2x^2 + 4x - 96 = 0$

$2(x^2 + 2x - 48) = 0$

$(x-6)(x-8) = 0$

$\therefore x - 6 = 0$ $\quad \therefore x = 6$

or $x - 8 = 0$ $\quad \therefore x = 8$

$\therefore$ The two numbers are : 6 and 8

15

Let the number be x

$\therefore 2x - \frac{1}{x} = 1$ $\quad \therefore 2x^2 - 1 = x$

$\therefore 2x^2 - x - 1 = 0$ $\quad \therefore (2x+1)(x-1) = 0$

$\therefore x = -\frac{1}{2}$ or $x = 1$

$\therefore$ The real number is $-\frac{1}{2}$ or 1

16

Let the number be x

$\therefore 2x - \frac{1}{x} = 1$ $\quad \therefore 2x^2 - 1 = x$

$\therefore 2x^2 - x - 1 = 0$ $\quad \therefore (2x+1)(x-1) = 0$

$\therefore x = -\frac{1}{2}$ or $x = 1$

$\therefore$ The real number is $-\frac{1}{2}$ or 1

17

Let the number be x $\quad \therefore x - \frac{2}{x} = 1$

$\therefore x^2 - 2 = x$ $\quad \therefore x^2 - x - 2 = 0$

$\therefore (x-2)(x+1) = 0$ $\quad \therefore x = 2$ or $x = -1$

$\therefore$ The number is 2 or -1

18

Let the width be x

$\therefore$ the length $= x + 2$

$\therefore x(x+2) = 35$ $\quad \therefore x^2 + 2x - 35 = 0$

$\therefore (x+7)(x-5) = 0$

$\therefore x + 7 = 0$ $\quad \therefore x = -7$ (refused)

or $x - 5 = 0$ $\quad \therefore x = 5$

$\therefore$ The width = 5 cm.

, The length = 7 cm.

$\therefore$ The perpimeter $= (7+5) \times 2 = 24$ cm.

19

$\because \frac{2^x \times (3^2)^{x+1}}{(2 \times 3^2)^x} = 3^x$ $\quad \therefore \frac{2^x \times 3^{2x+2}}{2^x \times 3^{2x}} = 3^x$

$\therefore 3^2 = 3^x$ $\quad \therefore x = 2$

20

$(\sqrt{2})^{5-9} \times (3)^{-2-1} = \frac{1}{(\sqrt{2})^4 \times 3^3} = \frac{1}{108}$

21

$\because 2^{x-3} = 32$ $\quad \therefore 2^{x-3} = 2^5$

$\therefore x - 3 = 5$ $\quad \therefore x = 8$

22

$\because 3^{x-7} = 5^0$ $\quad \therefore x - 7 = 0$ $\quad \therefore x = 7$

23

$\because 2^{x^2 - x} = 4$ $\quad \therefore 2^{x^2 - x} = 2^2$

$\therefore x^2 - x = 2$ $\quad \therefore x^2 - x - 2 = 0$

$\therefore (x-2)(x+1) = 0$

$\therefore x - 2 = 0$ $\quad \therefore x = 2$

or $x + 1 = 0$ $\quad x = -1$

$\therefore$ The S.S. $= \{2, -1\}$

No.	Solution
24	15
25	$\because 8^x = (2^3)^x = (2^x)^3 = 3^3 = 27$ $, 25^y = (5^2)^y = (5^y)^2 = 4^2 = 16$ $\therefore 8^x - 25^y = 27 - 16 = 11$
26	$\because 3^x = 27$ $\therefore 3^x = 3^3$ $\therefore x = 3$ $\therefore 4^{x+y} = 1$ $\therefore 4^{3+y} = 4^0$ $\therefore 3 + y = 0$ $\therefore y = -3$
27	$\because \left(\sqrt{\frac{3}{2}}\right)^{x-1} = \left(\sqrt{\frac{2}{3}}\right)^4$ $\therefore \left(\sqrt{\frac{3}{2}}\right)^{x-1} = \left(\sqrt{\frac{3}{2}}\right)^{-4}$ $\therefore x - 1 = -4$ $\therefore x = -3$
28	$\because (\sqrt{3})^{n+2} = 9$ $\therefore (\sqrt{3})^{n+2} = (\sqrt{3})^4$ $\therefore n + 2 = 4$ $\therefore n = 2$
29	$3(x-y)^2(x+y)^2 = 3[(x-y)(x+y)]^2$ $= 3[x^2 - y^2]^2$ $= 3(4-3)^2 = 3(1)^2 = 3$
30	1) $p = \frac{18}{50} = \frac{9}{25}$ 2) $p = 1 - \frac{12}{50} = \frac{38}{25} = \frac{19}{25}$ 3) $p = \frac{12+20}{50} = \frac{32}{50} = \frac{16}{25}$
31	Total = number ÷ Probability $= 4 \div \frac{1}{3} = 12$, Red = 12 – 4 – 5 = 3 balls
32	P (White) = $1 - \frac{1}{3} = \frac{2}{3}$ Total = Number ÷ Probability = $= 10 \div \frac{2}{3} = 15$ balls
33	P (White) = $1 - \frac{2}{3} = \frac{1}{3}$ Total = Number ÷ Probability = $= 5 \div \frac{1}{3} = 15$ balls

No.	Solution
34	Total = number ÷ Probability $= 2 \div \frac{1}{6} = 12$, Red = 12 – 2 – 4 = 6 balls
35	1) $P = \frac{2}{6} = \frac{1}{3}$ 2) $P = \frac{3}{6} = \frac{1}{2}$
36	1) $P = \frac{4}{8} = \frac{1}{2}$ 2) $P = \frac{2}{8} = \frac{1}{4}$ 3) $P = \frac{3}{8}$
37	1) $P = \frac{10}{20} = \frac{1}{2}$ 2) $P = \frac{4}{20} = \frac{1}{5}$
38	1) $P = \frac{6}{24} = \frac{1}{4}$ 2) $P = \frac{4}{24} = \frac{1}{6}$ 3) $P = \frac{2}{24} = \frac{1}{12}$ 4) $P = \frac{8}{24} = \frac{1}{3}$ 5) P = 0
39	P of loss = 1 – 0.3 – 0.6 = 0.1 Number = P × Total = 30 × 0.1 = 3 matches
40	Number of win = 0.6 × 30 = 18 m P of loss = 1 – 0.3 – 0.6 = 0.1 Number of loss = 0.1 × 30 = 3 m
41	S = { 23 , 24 , 32 , 34 , 42 , 43 } 1) $P = \frac{4}{6} = \frac{2}{3}$ 2) $P = \frac{4}{6} = \frac{2}{3}$
42	1) $P = \frac{4}{7} = \frac{2}{3}$ 2) $P = \frac{2}{7}$
43	$\frac{3}{8}$
44	1) $P = \frac{6}{50} = \frac{3}{25}$ 2) $P = \frac{11+16+8}{50} = \frac{35}{50} = \frac{7}{10}$
45	P of Girls = 1 – 0.6 = 0.4 Number of Girls = P × Total = 0.4 × 230 = 92 Girls

Revision on factorization by out the highest common factor (H.C.F)

i.e.

Factorizing the algebraic expression means to write it as a product of two factors or more.

How to factorize an expression by taking out the (H.C.F.) :

1. Determine the H.C.F. of the terms of the algebraic expression.
2. Put the H.C.F. out of two arcs.
3. Divide each term of the algebraic expression by the H.C.F. and put the quotients inside the arcs.
4. $\because$ H.C.F. $= x\,y$ $\therefore 3x^2y + 2xy^2 - xy = xy(3x + 2y - 1)$
5. $\because$ H.C.F. $= 2(m+3)$ $\therefore 2x(m+3) - 4y(m+3) = 2(m+3)(x - 2y)$
6. $\because y - z = -(z - y)$, $\because$ H.C.F. $= (z - y)$ $\therefore x(z - y) + \ell(y - z)$
$= x(z - y) - \ell(z - y) = (z - y)(x - \ell)$

factorizing quadratic trinomial in the from : $x^2 + b\,x + c$

From the previous , we deduce that :

The trinomial which is in the form : $x^2 + b\,x + c$ is factorized to two factors :

- The first term in each factor is x
- The two other terms in the two factors are two numbers whose product is c (the last term in the trinomial), and their sum is b (the coefficient of x in the trinomial).

From the previous example , we notice that :

When we factorize the trinomial : $x^2 + b\,x + c$ in the form $(x + \ell)(x + m)$, then :

1. If c is positive (*i.e.* The product of the two numbers is positive)
, then ℓ and m have the same sign as b
2. If c is negative (*i.e.* The product of the two numbers is negative)
, then ℓ and m have different signs such that the great one (numerically) has the same sign as b

Remarks

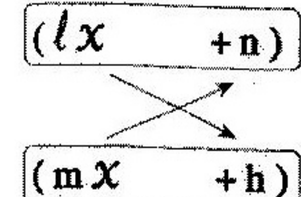
Before factorizing the trinomial , we must do the following :

- Arrange the terms of the expression descendingly or ascendingly according to the indices (exponents) of one of the given algebraic symbols. It is better to be descending.
- Taking out the H.C.F. of the terms of the expression.
- Performing operations included in arcs and simplifying the algebraic expression.

Factorizing quadratic trinomial

To factorize the trinomial : $a x^2 + b x + c$ where ($a \neq \pm 1$), we do as follows :

1. Factorize : $a x^2$ into two factors : « $l x$, $m x$ » and write them inside two parentheses as shown in the opposite figure.



2. Factorize the last term in the trinomial (c) into two factors : « n and h » and write them as shown in the previous parentheses.
3. Find : «The product of extremes (outer terms) + the product of means (inner terms) » If the sum equals the middle term in the trinomial , then the factorization is true. If not , then the factorization is false hence , we should try again to get the true factorization.

Remark

- If the sign of the last term in the trinomial is positive , then the sign of the second term in each of the parentheses is the same as the sign of the middle term in the trinomial.
- If the sign of the last term of the trinomial is negative , then the two signs of the second term in each of the parentheses are different.

The perfect square

The perfect square trinomial has the following properties :

1. The first term is a perfect square and it is always positive.
2. The third term is a perfect square and it is positive also.
3. The middle term = $\pm 2\sqrt{1^{st}\text{term}} \times \sqrt{3^{rd}\text{term}}$

Remark

If the trinomial is a perfect square , then :

1. The middle term = $\pm 2 \times \sqrt{\text{the first term}} \times \sqrt{\text{the third term}}$
2. The first term = $\dfrac{(\text{the middle term})^2}{4 \times \text{the third term}}$
3. The third term = $\dfrac{(\text{the middle term})^2}{4 \times \text{the first term}}$

Factorizing the perfect square trinomial

If the trinomial is a perfect square , then we can factorize it to be in the form :

$$\left(\sqrt{\text{The first term}} \pm \sqrt{\text{The third term}}\right)^2$$

Notice that: The sign between the two terms inside the parentheses is the same sign of the middle term in the trinomial after ordering its terms descendingly or ascendingly according to the exponents of one of its symbols.

Factorizing The Difference squares

We know that : $(a + b)(a - b) = a^2 - b^2$ *i.e.* $a^2 - b^2 = (a + b)(a - b)$

The expression : $a^2 - b^2$ is the difference of two squares of the two quantities a and b , therefore it is called the difference of two squares.

Then we deduce that :

The difference of two squares of two quantities

= (the sum of the two quantities) × (the difference of the two quantities)

Factorizing The sun , Difference of tow Cubes

Hence we deduce that :

The sum of two cubes of two quantities =

(the first + the second) (the square of the first – the first × the second + the square of the second)

i.e. $a^3 \oplus b^3 = (a + b)(a^2 \ominus ab + b^2)$

For example :

$x^3 + 8 = x^3 + 2^3 = (x + 2)(x^2 - x \times 2 + 2^2)$

$= (x + 2)(x^2 - 2x + 4)$

Hence we deduce that :

The difference between two cubes of two quantities =

(the first – the second) (the square of the first + the first × the second + the square of the second)

i.e. $a^3 \ominus b^3 = (a - b)(a^2 \oplus ab + b^2)$

Factorizing By Grouping :-

Example 1

Factorize : $2a^2 - 2b + ab - 4a$

Solution

Let us divide the expression as follows : $2a^2 - 2b + ab - 4a = (2a^2 - 2b) + (ab - 4a)$

Taking out the H.C.F. between the terms of each of : $2a^2 - 2b$ and $ab - 4a$

, we find that the main expression $= 2(a^2 - b) + a(b - 4)$, then we notice that there is no common factors between $2(a^2 - b)$ and $a(b - 4)$, then we should regroup the main expression by another way as follows :

$2a^2 - 2b + ab - 4a = (2a^2 + ab) + (-2b - 4a)$ (Commutative and associative properties)

$= a(2a + b) - 2(b + 2a)$

$= a(2a + b) - 2(2a + b)$

Notice that : $b + 2a = 2a + b$

We notice here that there is a common factor which is $(2a + b)$, then we complete factorization by taking out the common factor to be $2a^2 - 2b + ab - 4a = (2a + b)(a - 2)$

Factorizing By Completing the Square :-

Example 1

Factorize each of the following expressions : $4x^4 + y^4$

Add to the given expression : $2 \times \sqrt{4x^4} \times \sqrt{y^4}$ ***i.e.*** $4x^2y^2$

, then we subtract it again in order not to change the main expression.

$$\therefore 4x^4 + y^4 = 4x^4 + y^4 + (4x^2y^2 - 4x^2y^2)$$

$$= (4x^4 + 4x^2y^2 + y^4) - 4x^2y^2$$ (Commutative and associative properties)

$$\left(\begin{matrix}\text{A perfect square}\\ \text{trinomial}\end{matrix}\right) - \left(\begin{matrix}\text{A perfect square}\\ \text{monomial}\end{matrix}\right)$$

$$= (2x^2 + y^2)^2 - (2xy)^2$$

$$= (2x^2 + y^2 - 2xy)(2x^2 + y^2 + 2xy)$$

(Factorization of the difference between two squares)

$$= (2x^2 - 2xy + y^2)(2x^2 + 2xy + y^2)$$

(Ordering the terms of each expression)

Solving Quadratic Equations in one Variable

Fact

If a and b are two real numbers and if $a \times b = \text{zero}$, then $a = 0$ or $b = 0$

For example :

- If $x(x-3) = 0$,
  then $x = 0$
  or $x - 3 = 0$, then $x = 3$

- If $(x+2)(3x-5) = 0$,
  then $x + 2 = 0$ ***i.e.*** $x = -2$
  or $3x - 5 = 0$ ***i.e.*** $x = \frac{5}{3}$

For solving the quadratic equation in one variable using factorization , we do as follows :

1. Make one of its sides equal zero , let it be the right hand side.
2. Simplify the expression if needed to put the equation in the form : $ax^2 + bx + c = 0$
3. Factorize the left side to two factors to get the values of x

Part (1)

(1) Complete the following:

1) $(a-2)(2a-3) = \ldots\ldots - 7a + \ldots\ldots$

2) $(X + \ldots\ldots)(2X-3) = \ldots\ldots + \ldots\ldots - 15$

3) $(X + \ldots\ldots)(3X-2) = \ldots\ldots + \ldots\ldots - 10$

4) $(2X + 3Y)(\ldots\ldots + 2Y) = 2X^2 + \ldots\ldots + \ldots\ldots$

5) $(2a + \ldots\ldots)(\ldots\ldots + 3b) = (2a^2 + \ldots\ldots + 3b^2)$

6) $3a^2 + 7a + 2 = (3a + \ldots\ldots)(a + \ldots\ldots)$

7) $\ldots\ldots X^2 + 5X - 12 = (2X-3)(\ldots\ldots\ \ldots\ldots\ \ldots\ldots)$

8) $X^3 - \ldots\ldots = (X - \ldots\ldots)(\ldots\ldots + \ldots\ldots + 4)$

9) $(X-Y)^2 + 4XY = (\ldots\ldots + \ldots\ldots)^2$

10) $(5a - \ldots\ldots)^2 = \ldots\ldots - 30a + \ldots\ldots$

11) $(7X - 5Y)(\ldots\ldots - \ldots\ldots) = 49X^2 - \ldots\ldots + 25Y^2$

12) $11X^2 - 4XY - \ldots\ldots = (X-Y)(\ldots\ldots + \ldots\ldots)$

13) $\ldots\ldots - 49X^2 = (3 - \ldots\ldots)(3 + \ldots\ldots)$

14) $9X^2 - 3X = 3X(3X - \ldots\ldots)$

15) $8a^3 - b^3 = (\ldots\ldots - b)(4a^2 + \ldots\ldots + \ldots\ldots)$

16) $4X^2 - \ldots\ldots + \ldots\ldots = (\ldots\ldots - 3Y)^2$

17) The set values of a which make the expression: $X^2 + aX - 15$ can be factorized are ……………………

18) The expression $4X^2 - 12X + K$ is a perfect square when K = ……

19) If the expression $121X^2 + KX + 100$ is perfect square when K = …….

20) The expression : $9X^2 - 30X + a$ is perfect square when a= …….

21) If $X^2 - Y^2 = 35$, $X - Y = 5$ then $X + Y =$ ………

22) If the expression: $X^2 + aX - 15$ can be factorized then the negative values of a are ....

23) If $a^2 + b^2 = 7$, $ab = 3$ then $(a - b)^2 =$ ....

24) The expression $25a^2 + 10a + m$ is a perfect square when m= ......

25) If $x^2 - K + 10 = (X - 3)(X + 3)$ then K = ...

26) If the expression $X^2 + mX + 16$ is a perfect square then m = ...

27) If : $X^2 + K + 17 = (X - 5)(X + 5)$ then K= ......

28) If : $X + \frac{1}{X} = 5$ then $X^2 + \frac{1}{X^2} =$ ...... where $X \neq$ zero.

29) If the perimeter of the square equals 2X cm then its area equals ......

30) If $(X - 3)$ is one of the two factors of the expression $X^2 + 2X - 15$ then the other factor is ....

31) If (-4) is one root of the two roots for the equation $X^2 + 3X - 4 = 0$ then the other root is ......

32) The solution set of the equation: $X^2 + 4 = 0$ is ......

33) The solution set of the equation: $X^2 - 1 = 0$ is ......

34) The simplest form of the algebraic expression $X(y - z) + L(y - z)$ is ....

35) If the age of Kamal now is X year then his age after 5 years is ......

36) If $a(X + Y) - b(X + Y) = 15$ and $(X + Y) = 5$ the $a - b =$ ....

37) If $(X + 5)$ is one of the roots of $X^3 + 125$, the other root = ...

38) If $(X + Y)^2 = 42$, $X^2 + Y^2 = 12$ then XY = ...

(2) Choose the correct answer:-

1) If $X = 2$, $Y = 5$ then : $X^2 + 2XY + Y^2$ equals ......

a) 5 b) 7 c) 9 d) 49

2) $X^2 - 4$ equals : ......

a) $4 - X^2$ b) $(X - 2)^2$ c) $(X-2)(X+2)$ d) $(X - 4)^2$

3) $(a - 1)(a^2 + a + 1)$ equals ......

a) $a^3 - 1$ b) $a^3 + 1$ c) $(a - 1)^3$ d) $1 - a^3$

4) If $X^2 + Y^2 = 7$, $XY = 3$ then $(X - Y)^2$ equals ......

a) -1 b) 1 c) ± 1 d) 10

5) If $16X^2 + KX + 9$ is a perfect square then K equals ......

a) ± 6 b) ± 12 c) ± 24 d) ± 144

6) If $X^2 - 6X + K$ is a perfect square then K equals ......

a) 3 b) 6 c) 9 d) 36

7) If $KX^2 - 12X + 4$ is a perfect square then K equals ......

a) -6 b) -4 c) -2 d) 9

8) If $(a + b)^2 = 43$, $(a^2 + b^2) = 35$ then ab equals ......

a) 4 b) 8 c) 16 d) 78

9) If the expression $X^2 + KX - 42$ can be factorized, then K can't equal

a) -2 b) 2 c) 3 d) 5

10) If the expression $X^2 + KX + 2$ can be factorized then K equals

a) 1 b) 2 c) 3 d) 4

11) If $X^2 - Y^2 = 12$, $X - Y = 3$ then $X + Y$ equals ....

a) 3 b) 4 c) 12 d) 15

12) If $X^2 + KX - 6 = (X + 3)(X - 2)$ then K equals ....

a) -1 b) 1 c) 2 d) 3

13) The expression $X^2 + 8X + C$ is a perfect square when C equals ….

a) 2 b) 4 c) 16 d) 64

14) If $(X + Y)^2 = 24$, $XY = 8$, then $X^2 + Y^2 =$ ……….

a) 8 b) 16 c) 24 d) 32

15) If $X^2 + KX - 21 = (X - 3)(X + 7)$ then K equals ……….

a) -4 b) 4 c) 8 d) 20

16) If $(X + Y)^2 = 10$, $(X^2 + Y^2) = 4$ then XY equals ……..

a) 2 b) 3 c) 6 d) 14

17) The expression: $(X - 2Y)(X^2 + 2XY^2 + 4Y^2)$ equals ………

a) $X^3 - 2Y^3$ b) $X^3 - 8Y^3$ c) $X^3 + 2Y^3$ d) $X^3 + 8Y^3$

18) If $64a^2 - 32a + K$ is a perfect square then K equals ……….

a) 1 b) 4 c) 11 d) 16

19) If $(X - Y) = 5$, $X^2 + XY + Y^2 = 7$ then $X^3 - Y^3$ equals ……..

a) 2 b) 7 c) 12 d) 35

20) The expression $X(Y + 3) + Z(Y + 3)$ equal ……….

a) $X + Y + Z + 6$ b) $(X + Z)(Y + 3)$

c) $(X + Z)(Y + 3)^2$ d) $(X + Z) \times 2(Y + 3)$

21) If $a^2 + 2ab + b^2 + 25$, then a + b equals ……….

a) -5 b) 5 c) ± 5 d) 625

22) If X = 13 , Y = 11 then $X^2 - 2XY + Y^2$ equals ……….

a) 2 b) 4 c) 24 d) 48

23) If $8X^3 + a^3 = (2X + a)(4X^2 - 4aX + a^2)$ then a equals ……….

a) 7 b) 14 c) 49 d) 343

24) The result of the expression: $(8X^3 - 27Y^3) \div (2X - 3Y)$ where $2X \neq 3Y$ equals ….

a) $4X^2 + 6XY + 6Y^2$ b) $4X^2 - 6XY + 6Y^2$

c) $4X^2 - 12XY + 9Y^2$ d) $4X^2 + 12XY + 9Y^2$

25) If $X^3 + 27 = (X + 3)(X^2 + K + 9)$ then K equals ....

a) -6X b) -3X c) 3X d) 6X

26) If the expression $X^2 + aX + 9$ is a perfect square then a equals...

a) zero b) ± 3 c) ± 6 d) ± 12

27) If $X^3 - Y^3 = 26$, $X^2 + XY + Y^2 = 13$ then $X - Y =$ ....

a) 2 b) 4 c) 13 d) 39

28) If 2 is a solution for the equation $x^2 - 5x + a = 0$ then a equals

a) -3 b) -6 c) 3 d) 6

29) If four times a number is 48 then one third of this number equals

a) 4 b) 8 c) 12 d) 16

30) The solution set of the equation: $(x - 1)^2 = 0$ is ....

a) { 0 } b) { –1} c) {1 , –1} d) { 1 }

31) The dimension of a rectangle X cm, X + 1 cm and it area is 30 cm^2 then x = ...

a) 3 b) 4 c) 5 d) 6

32) If the average of two numbers is 5 one of them if 3 then the other is ....

a) 2 b) 4 c) 7 d) 13

33) If the age of Zyad now is X year then his age before three years was ....

a) 3X b) 3 – X c) X – 3 d) X + 3

34) The area of a rectangle whose length X + Y and its width X – Y is ....

a) 2X b) 4X c) $X^2 - Y^2$ d) $(X - Y)^2$

35) A natural number if we divide it by each of the numbers 2, 3, 4 then the remainder is 1 but if divide by 5 there is no remainder, then this number is ....

a) 13 b) 15 c) 25 d) 35

(3) Factorize each of the following:

1) $X^2 - 7X - 8$

2) $Y^2 - 14Y + 49$

3) $2Y^4 + 3Y^2 - 5$

4) $3X^2 - 15X + 12$

5) $4X^2 - 20X + 25$

6) $X^6 - 9X^3 + 8$

7) $25X^3 - 10X^2Y + XY^2$

8) $X^2Y^2 - 24XY - 25$

9) $-19ab + 6b^2 + 15a^2$

10) $6X^2 - 13XY + 6Y^2$

11) $25a^4 - 1$

12) $25X^2Y - 15XY + 35XY$

13) $16X^4 - 81$

14) $X^3 + 64Y^3$

15) $\frac{1}{3}X^3 - 9$

16) $\frac{X^2}{4} - \frac{Y^2}{49}$

17) $12X^3Y^4 + 3X^5Y^2$

18) $8X^3 - 2Y^2X$

19) $2XY^3 - \frac{1}{8}X^3Y$

20) $2X^3Y - 8XY^3$

21) $\frac{3}{4}X^3 - 48$

22) $0.027a^3 - 0.001b^3$

23) $(a + b)^3 + C^3$

24) $(a - 2b)^3 - 4(a - 2b)$

25) $2 - 2(X - 1)^3$

26) $Y^3 - Y^2 - 9Y + 9$

27) $a^3 - ab^2 - a^2b + b^3$

28) $X^3 - 3X^2 - 6X + 8$

29) $4X^2 - 4XY - 16 + Y^2$

30) $3X^3 - 2X^2 + 12X - 8$

31) $(5X - 2)^2 - 4X - 5$

32) $(X - 2)(X + 3) - 6X$

33) $50 - 2(2X + 1)^2$

34) $5Y^2 - 4X(7Y + 3X)$

(4) Answer the following question:

1) Using the difference between two squares to evaluate $(23.5)^2 - (18.5)^2$

2) Using the factorization to evaluate $2(26.18)^2 - 2(23.82)^2$

3) Simplify to the simplest form: $(a - 2b)(a + 2b) + 5b^2$

4) Simplify to the simplest form: $X^2 (2X - 3) - 9 (2X - 3)$

5) Simplify: $(2a - b)^2 + (a + 2b)(a - b)$ then find the value when

$a = 1, b = 2$

6) Simplify to the simplest form: $(2X - 3Y)^2 + (3X - 1)(3X + 1)$

7) Simplify to the simplest form: $(2a - 3b)(a + 2b) + a^2 - 2b^2$

8) If $(Y + 2)$ is one factor of the two factors of the expression

$4Y^2 + Y - 14$ find the other factor.

9) If $(3a + 4b)$ is one factor of the expression $15a^2 + 17ab - 4b^2$

find the other factor.

10) Using factorization to evaluate the value of X if: $(25)^2 - (15)^2 = 40X$

11) If : $X + Y = 7$, $a - 2b = 4$ find the numerical value of

$a(X + Y) - 2b (X + Y)$.

12) Put in the simplest form: $(X - Y)(X + Y)(X^4 - 2X^2Y^2 + Y^4)$

13) If $X + \frac{1}{X} = 5$ then find $X^2 + \frac{1}{X^2}$

14) If $X^2 + \frac{1}{X^2} = 34$ find the value of $X + \frac{1}{X}$.

15) Find in R the S.S of the following equations:

a) $X^2 = 4X$

b) $4X^2 - 9 = 0$

c) $16X^4 - 81 = 0$

d) $X^2 - X - 12 = 0$

e) $9 - (X + 1)^2 = 0$

f) $X (X - 2) - 3 (2 - X) = 0$

g) $(4X - 1)(X + 3) - (X - 5)^2 + 4 = 0$

h) $\frac{X-1}{7} = \frac{8}{X}$

k) $X (X - 2) + 1 = 0$

Part (2)

(1) Answer the following questions:

1) A rectangle of area $x^3 - x^2 - 3x + 6$ and of length $x^2 - 3x + 3$ find its width in term of x then find its perimeter at x = 6 cm.

2) A rectangle of dimension (x + 1) cm, (x + 5) cm find its area and its perimeter.

3) A square of side length (5a + b) cm, where $a, b \in \mathbb{Z}^+$ find its area then find the numerical value of its area when a = 2 cm, b = 3 cm.

4) The sum of the squares of two consecutive even integers numbers is 100 find the two numbers.

5) The length of a rectangle is more than its width by 3 cm and its area 28 cm^2 find its dimension.

6) The ratio between two positive numbers is 2 : 3 and their product is more than twice the greater by 12 find the two numbers.

7) The length of a rectangle is more than its width by 5 cm and if its area 36 cm^2 find its perimeter.

8) A square of side length X cm and a rectangle of dimensions 2 cm, X cm if the sum of their areas is 15 cm^2 find the perimeter of the square.

(2) Complete the following:

1) The number $(\sqrt{2})^{-3}$ in the simplest form is ……………..

2) The number $\frac{1}{(\sqrt{5})^{-2}}$ in the simplest form is ……………..

3) $\left(\frac{2}{3}\right)^{-4} = \left(\frac{\dots\dots}{\dots\dots}\right)^{2}$

4) If $3^{x-2} = 1$ then x = ……………..

5) If $3^{x-1} = 27$ then x = ……………..

6) The simplest form the expression $(\sqrt{2})^{zero} \times (\sqrt{2}) \times (\sqrt{2})^{2} \times (\sqrt{2})^{3}$

is …………..

7) The greater number $(-\sqrt{11})^{24}$ or $(-\sqrt{11})^{25}$ is …………..

8) The simplest form of the expression $\left((\sqrt{7})^{2}\right)^{3} - \left((\sqrt{7})^{3}\right)^{2}$ = ……….

9) The value of the expression $\sqrt[3]{\frac{216}{2^3 \times 3^3}}$ = …………..

10) If five times a number is 5^3 then $\frac{4}{5}$ of this number is …………..

11) The simplest form of the expression: $2^{zero} + (2)^{-1} - \left(\frac{-1}{\sqrt{2}}\right)^{2}$ = ………

12) If $X = (\sqrt{3}+2)^{9}$, $Y = (\sqrt{3}-2)^{9}$ then XY = …………..

13) $X^{-2} + 1 = X^{-2}$ (…… + ……) where $X \neq 0$

14) If $3^{x} \times 2^{-x} = 1.5$ then x = ………..

15) If $4^{x-10} = \frac{1}{16}$ then $\sqrt[3]{X}$ = ………..

16) The simplest form of the expression: $2^{-3} \times (2)^{-2} \div 4^{-3}$ = ……….

17) The simplest form of the expression: $(3^{-2})^{3} \div 9^{-3} \times (-2)^{-1}$ = ……….

18) The simplest form of the expression: $(2^{3} \times 2^{-2})^{7} \div \left(\sqrt[3]{-8}\right)^{zero}$ = ……

19) If $3^{x} + 3^{x} + 3^{x} = 1$ then x = …………….

20) If $\frac{2^{x} \times 3^{x}}{(12)^{x}} = \frac{1}{2}$ then x = ………….

(3) Choose the correct answer:

1) 3^{-2} equals ....

a) -9 b) $-\frac{1}{9}$ c) $\frac{1}{9}$ d) 9

2) 0.002×0.05 equals ....

a) 10^{-5} b) 10^{-4} c) 10^{4} d) 10^{5}

3) What is the nearest value of $11^2 + 9^2$

a) $22 + 18$ b) $211 + 29$ c) $120 + 80$ d) $120 + 20$

4) The value of the expression $2^{20} + 2^{21}$ equals ....

a) 2×2^{40} b) 2×2^{41} c) 3×2^{20} d) 3×2^{21}

5) One sixth of the number: $2^{12} \times 3^{12}$ is ....

a) 6^{2} b) 6^{4} c) 6^{11} d) 6^{23}

6) The value of the expression: $2^5 + (\sqrt{2})^{10}$ equals

a) 2^{6} b) 2^{10} c) $(\sqrt{2})^{15}$ d) $(\sqrt{2})^{20}$

7) $4^3 + 4^3 + 4^3 + 4^3$ equals ....

a) 4^{3} b) 4^{4} c) 4^{12} d) 4^{81}

8) $\left(\frac{\sqrt{5}}{3}\right)^{-2}$ equals ....

a) $-\frac{9}{5}$ b) $-\frac{5}{9}$ c) $\frac{5}{9}$ d) $\frac{9}{5}$

9) If $X = \frac{\sqrt{9}}{\sqrt{3}}$ then X^{-1} equals:

a) $\frac{\sqrt{3}}{3}$ b) $\frac{\sqrt{3}}{\sqrt{2}}$ c) $\sqrt{3}$ d) 2

10) If $6^x = 7$ then 6^{x+1} equals ....

a) 8 b) 13 c) 36 d) 42

11) If $3^x = 5$ then $(27)^x$ equals ....

a) 9 b) 25 c) 125 d) 729

12) If $5^x = 4$ then 5^{x-1} equals ....

a) 1.25 b) 0.8 c) 0.125 d) 0.08

13) If $9^{8-2X} = 1$ then X equals ....

a) zero b) $\frac{1}{4}$ c) 4 d) 6

14) If $(X-5)^0 = 1$ then $X \in$ ....

a) $\mathbb{R} - \{5\}$ b) $\mathbb{R} - \{-5\}$ c) $\{5\}$ d) $\mathbb{R}$

15) If $5^{X-3} = 1$, then $(2X)^2$ equals ....

a) 36 b) 9 c) 4 d) 3

16) $(\sqrt{3}+\sqrt{2})^9(\sqrt{3}-\sqrt{2})^9$ equals ....

a) 1 b) $\sqrt{5}$ c) $\sqrt{6}$ d) 5

17) If $3^X = 5$, $\frac{1}{3^Y} = 7$ then $3^{X+Y} =$ ....

a) $\frac{5}{7}$ b) $\frac{7}{5}$ c) 2 d) 12

18) If $2^{X-1} \times 3^{1-X} = \frac{9}{4}$ then $X =$ ....

a) -3 b) -1 c) 1 d) 3

19) The numerical value of the expression $\frac{2^{2n+1} \times 5^{2n+1}}{10^{2n}}$

a) $\frac{1}{10}$ b) 7 c) 10 d) 100

20) The expression: $(5^{x+2} - 5^{x+1}) \div 5^x$

a) 5 b) 10 c) 15 d) 20

21) The expression: $\frac{3^x \times 3^x \times 3^x}{3^x + 3^x + 3^x}$

a) 3^{2x-1} b) 3^{1-2x} c) 3^{x^3-3x} d) 3^3

(4) Answer the following questions:

1) Find the value of the following in the simplest form:

1) 3^{-1} 2) $\left(\frac{1}{4}\right)^{-1}$ 3) $\left(\frac{3}{2}\right)^{-3}$

4) $(\sqrt{5})^{4}$ 5) $(-\sqrt{3})^{-2}$ 6) $(\sqrt[3]{7})^{-3}$

7) $\left(\frac{-1}{\sqrt{2}}\right)^{6}$ 8) $(0.01)^{-2}$ 9) $\left(-\frac{\sqrt{2}}{2}\right)^{-4}$

2) Find the value of each of the following in simplest form:

1) $(\sqrt{3})^{-2}$ 2) $(-\sqrt[3]{4})^{-3}$ 3) $\left(\frac{1}{\sqrt{2}}\right)^{-3}$

4) $\left(\frac{\sqrt{3}}{3}\right)^{-5}$ 5) $(\sqrt{3})^{-4} \times (-\sqrt{2})^{4}$ 6) $\left(\frac{1}{\sqrt{3}}\right)^{5} \div \left(\frac{1}{\sqrt{3}}\right)^{7}$

3) Simplify:

1) $(\sqrt{2})^{2} \times (\sqrt{2})^{4}$ 2) $(-\sqrt{5})^{9} \div (-\sqrt{5})^{5}$

3) $(\sqrt{2})^{4} \times (\sqrt{3})^{4}$ 4) $\left((\sqrt{3})^{2} \times (-\sqrt{2})^{3}\right)^{2}$

5) $\left(\frac{2\sqrt{2}}{3\sqrt{3}}\right)^{4}$ 6) $\frac{(\sqrt{3})^{7} \times (\sqrt{3})^{8}}{(\sqrt{3})^{6}}$

4) Simplify each of the following in simplest form:

1) $\frac{(\sqrt{3})^{-5} \times (\sqrt{3})^{-4}}{(\sqrt{3})^{-10}}$ 2) $\frac{(10)^{2} \times (10)^{-7}}{(0.1)^{2} \times 0.001}$

3) $\frac{(\sqrt{2})^{5} \times (3)^{-2}}{3 \times (\sqrt{2})^{9}}$ 4) $\frac{(\sqrt{3})^{-3} \times (\sqrt{2})^{-4}}{(\sqrt{2} \times \sqrt{3})^{-5}}$

5) If X = 3 , Y = $\sqrt{2}$ find in the simplest form the value of each of the following:

a) $X^{-2}\,Y^{-4}$ b) $(X^{-2} \times Y^{4})^{-2}$ c) $\left(\frac{X}{Y}\right)^{-3}$

6) If $X = \frac{\sqrt{3}}{2}$, $Y = \frac{1}{\sqrt{3}}$, $Z = \frac{\sqrt{2}}{2}$. Find the value of: $X^2 + (XZ)^2 \times Y^2$

7) If X = 2 , $Y = \sqrt{3}$ find in the simplest form the value of :

i) $(X + Y)^4 (X - Y)^4$ ii) $\left(\frac{X+Y}{X-Y}\right)^{-2}$

8) If: $a = \frac{1}{\sqrt{2}}$, b = –1 find the value of $7a^6 + (1 - b)^{-3}$

9) If $a = \sqrt{3}$, $b = \sqrt{2}$ find the value of :

i) $a^4 - b^4$ ii) $\frac{a^4}{b^4}$

10) If $X = 2\sqrt{2}$, Y = 3 find the value of: $(X^2 - Y^2)^3$

11) If: $\left(\sqrt{\frac{3}{2}}\right)^x = \frac{4}{9}$ find the value of $\left(\frac{2}{3}\right)^{x+1}$

12) If $X = \frac{\sqrt{3}}{2\sqrt{5}}$, $Y = \frac{1}{\sqrt{2}}$ prove that: $5X^2 + Y^4 = 1$

13) If $X = 2\sqrt{3}$, $Y = \frac{4}{\sqrt{2}}$ prove that: $\sqrt{X^2 + Y^4 + 3} = 9$

14) Find the value of X in each of the following:

1) $2^x = 32$ 2) $2^{x-3} = 1$ 3) $3^{x-2} = 81$

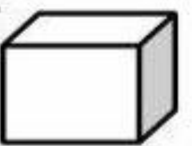
4) $(\sqrt{3})^{x-1} = 9$ 5) $3^{x-2} = \frac{1}{9}$ 6) $\left(\frac{2}{5}\right)^{2x-1} = \frac{8}{125}$

15) Prove that: $\frac{(27)^{x-1} \times 8^x}{(2\sqrt{2})^{2x} \times (3\sqrt{2})^{2x}} = \frac{1}{27}$

16) If $\frac{8^x \times 9^x}{(18)^x} = 64$ find the value of $(4)^{-x}$

17) Simplify: $\frac{4^{x+1} \times 9^{2-x}}{6^{2x}}$ then calculate its value at $x = 1$

18) If the total area of a cube equals 3.375 × 10^2 unit area:



i) Find the length of the cube edge

ii) The volume of the cube

19) If V = $\frac{4}{3}\pi r^3$ is a rule volume of a sphere V of radius r, find radius of a sphere of volume = 3.8808 × 10^4 (consider $\pi = \frac{22}{7}$)

Model Answers
Part (1)

(1) Complete the following:

1) $2a^2$, 6
2) 5 , $2X^2$, 7X
3) 5 , $3X^2$, 13X
4) X , 7XY , $6Y^2$
5) b , a , 7ab
6) 1 , 2
7) 2 , X + 4
8) 8 , 2 , X^2 , 2X
9) $(X + Y)^2$
10) 3 , $25a^2$, 9
11) (7X – 5Y) , 70XY
12) 7 , (11X + 7Y)
13) 9 , 7X , 7X
14) 1
15) 2a , 2ab , b^2
16) 12XY, 3Y , 2X
17) 2 , -2 , 14 , -14
18) 9
19) $\pm$ 220 X
20) 25
21) 7
22) -2
23) 1
24) 1
25) -19
26) $\pm$ 8X
27) -42
28) $(X + \frac{1}{X})^2 = 25$ $X^2 + \frac{1}{x^2} = 25 - 2 = 23$
29) $\frac{X^2}{4}$
30) X + 5
31) 1
32) ∅
33) $\pm$ 1
34) (X + L) (Y – Z)
35) X + 5
36) 3
37) $X^2 - 5X + 25$
38) 15

2) Choose the correct answer:-

1) 49
2) $(X-2)(X+2)$
3) a^3-1
4) 1
5) ± 24
6) 9
7) 9
8) 4
9) 3
10) 3
11) 4
12) 1
13) 16
14) 8
15) 4
16) 3
17) X^3-8Y^3
18) 4
19) 35
20) $(X+Z)(Y+3)$
21) ± 5
22) 4
23) 14
24) $4X^2+6XY+9Y^2$
25) $-3X$
26) ± 6
27) 2
28) 6
29) 4
30) $\{1\}$
31) 5
32) 7
33) $x-3$
34) x^2-y^2
35) 25

3) Factorize each of the following:

1) $(X-8)(X+1)$
2) $(Y-7)(Y-7)$
3) $(2Y+5)(Y-1)$
4) $(3X-3)(X-4)$
5) $(2X-5)(2X-5)$
6) $(X^3-8)(X^3-1)$
7) $X(25X^2-10Y+Y^2)$
   $= X(5X-Y)(5X-Y)$
8) $(XY-25)(XY+1)$
9) $15a^2-19ab+6b^2$
   $=(3a-2b)(5a-3b)$
10) $(3X-2Y)(2X-3Y)$
11) $(5a-1)(5a+1)$

12) $5XY\ (5X - 3 + 7)$

$5XY\ (5X + 4)$

13) $(4X^2 - 9)\ (4X^2 + 9)$

$= (2X - 3)\ (2X + 3)\ (4X^2 + 9)$

14) $(X + 4Y)\ (X^2 - 4XY + 16Y^2)$

15) $X^3 - 27$

$(X - 3)\ (X^2 + 3X + 9)$

16) $(\frac{X}{2} - \frac{Y}{7})\ (\frac{X}{2} + \frac{Y}{7})$

17) $3X^3\ Y^2\ (4Y^2 + X^2)$

18) $2X\ (4X^2 - Y^2)$

$= 2X\ (2X - Y)\ (2X + Y)$

19) $\frac{1}{8}XY\ (16Y^2 - X^2)$

$= \frac{1}{8}XY\ (4Y - X)\ (4Y + X)$

20) $2XY\ (X^2 - 4Y^2)$

$= 2XY\ (X - 2Y)\ (X + 2Y)$

21) $\frac{3}{4}X^3 - 48$ $\quad (X \frac{4}{3})$

$= X^3 - 64$

$= (X - 4)\ (X^2 + 4X + 16)$

22) $(0.3a - 0.1b)\ (0.09\ a^2 + 0.03ab + 0.01b^2)$

23) $(\ (a + b) + c)\ (\ (a + b)^2 - (a + b)\ c + c^2\ )$

24) $(a - 2b)\ (\ (a - 2b)^2 - 4\ )$

$= (a - 2b)\ (\ (a - 2b) - 2)\ (\ (a - 2b) + 2)$

25) $2\ (1 - (X - 1)^3)$

$2\ (1 - (X - 1)\ (X + X + 1)\ )$

26) $(Y^3 - Y^2) - (9Y - 9)$

$= Y^2 (Y - 1) - 9 (Y - 1)$

$= (Y^2 - 9) (Y - 1)$

$(Y + 3) (Y - 3) (Y - 1)$

27) $(a^3 - ab^2) - (a^2b - b^3)$

$= a (a^2 - b^2) - b (a^2 - b^2)$

$= (a - b) (a^2 - b^2)$

$= (a - b) (a - b) (a + b)$

28) $X^3 - 3X^2 - 6X + 8$

$= X^3 + 8 - 3X (X + 2)$

$= (X + 2) (X^2 - 2X + 4) - 3X (X + 2)$

$= (X + 2) (X^2 - 2X + 4 - 3X)$

$= (X + 2) (X^2 - 5X + 4)$

$= (X + 2) (X - 4) (X - 1)$

29) $(4X^2 - 4 XY + Y^2) - 16$

$= (2X - Y)^2 - 16$

$= (2X - Y - 4) (2X - Y + 4)$

30) $(3X^3 - 2X^2) + (12X - 8)$

$=X^2(3X - 2) + 4 (3X - 2)$

$= (X^2 + 4) (3X - 2)$

31) $25X^2 - 20X + 4 - 4X - 5$

$= 25X^2 - 24X - 1$

$= (25X + 1) (X - 1)$

32) $X^2 + X - 6 - 6X$

$= X^2 - 5X - 6$

$= (X - 6) (X + 1)$

33) $50 - 2(4X^2 + 4X + 1)$

$= 2(25 - (2X + 1)^2)$

$= 2(5 - (2X + 1)(5 + (2X + 1))$

$= 2(5 - 2X + 1)(5 + 2X + 1)$

$= 2(4 - 2X)(2X + 6)$

$= 8(2 - X)(X + 3)$

34) $5Y^2 - 28 X1 - 12Y^2$

$= (5Y - 2X)(Y + 6X)$

(4) Answer the following question:

1) $(23.5 - 18.5)(23.5 + 18.5) = 5 \times 22 = 110$

2) $2[(26.18)^2 - (23.82)^2]$

$= 2(26.18 - 23.82)(26.18 + 23.82) = 2 \times 2.36 \times 50 = 236$

3) $a^2 - 4b^2 + 5b^2$

$= a^2 + b^2$

4) $(X^2 - 9)(2X - 3) = (X - 3)(X + 3)(2X - 3)$

5) $(2a - b)^2 + (a + 2b)(a - b)$

$4a^2 - 4ab + b^2 + a^2 - ab + 2ab - 2b^2$

$= 5a^2 - 3ab - b^2$

$= 5X(1)^2 - 3 \times 1 \times 2 - (2)^2 = 5 - 6 - 4 = \boxed{-5}$

6) $(2X - 3Y)^2 + (3X - 1)(3X + 1)$

$4X^2 - 12XY + 9Y^2 + 9X^2 - 1$

$= 13X^2 - 12XY + 9Y^2 - 1$

7) $2a^2 + 4ab - 3ab - 6b^2 + a^2 - 2b^2$

$= 3a^2 + ab - 8b^2$

8) $4Y^2 + y - 14 = (Y + 2)(4Y - 7)$

9) $15a^2 + 17ab - 4b^2 = (3a + 4b)(5a - b)$

10) $(25 - 15)(25 + 15) = 40X$

$10 \times 40 = 40X$

$\boxed{X = 10}$

11) $a(X + Y) - 2b(X + Y) = (X + Y)(a - 2b)$

$= 7 \times 4 = 28$

12) $(X - Y)(X + Y)(X^4 - 2X^2Y^2 + Y^4)$

$(X^2 - Y^2)(X^2 - Y^2)^2 = (X^2 - Y^2)^3$

13) $(X + \frac{1}{x})^2 = 25$

$X^2 + \frac{1}{x^2} + 2 = 25$

$X^2 + \frac{1}{x^2} = 23$

14) $(X + \frac{1}{x})^2 = X^2 + \frac{1}{x^2} + 2$

$= 34 + 2 = 36$

$\therefore X + \frac{1}{x} = \sqrt{36} = \boxed{6}$

<u>(15) Find in R the S.S of the following equations:</u>

a) $x^2 - 4x = 0$

$x(x - 4) = 0$

$S.S = \{0, 4\}$

b) $(2x - 3)(2x + 3) = 0$

$S.S = \{\frac{3}{2}, -\frac{3}{2}\}$

c) $(4x^2 - 9)(4x^2 + 9)$

$(2x - 3)(2x + 3)(4x^2 + 9)$

$S.S = \{\frac{3}{2}, -\frac{3}{2}\}$

d) $(x-4)(x+3)=0$

$S.S = \{4, -3\}$

e) $-(x+1)^2 = -9$

$(x+1)^2 = 9$

$x+1 = 3$

$x+1-3 = 0 \rightarrow x-2 = 0$

$S.S = \{2\}$

f) $-(x+3)(x-2) = 0$

$S.S = \{-3, 2\}$

g) $(4x-1)(x+3)-(x+5)^2+4=0$

$4x^2+12x-x-3-(x^2+10x+25)+4=0$

$4x^2+12x-x-3-x^2-10x-25+4=0$

$3x^2+x-24=0$

$(3x-8)(x+3)=0$

$S.S = \{\frac{8}{3}, -3\}$

h) $x^2-x=56$

$x^2-x-56=0$

$(x+7)(x-8)=0$

$S.S = \{-7, 8\}$

k) $x^2-2x+1=0$

$(x-1)(x-1)=0$

$S.S = \{1\}$

Part (2)

(1) Answer the following questions:

1)

2) A. of rectangle = $(x + 1)(x + 5) = x^2 + 6x + 5$

P. of rectangle = $[x + 1 + x + 5] \times 2 = [2x + 6] \times 2$

$= 4x + 12$

3) A. of square = $(5a + b)(5a + b)$

$= 25a^2 + 10ab + b^2$

$= 25 \times 2^2 + 10 \times 2 \times 3 + 3^2$

$= 100 + 60 + 9 = 169$

4) Let the two number be s , $x + 2$

$x^2 + (x + 2)^2 = 100$

$x^2 + x^2 + 4x + 4 = 100$

$x^2 + 2x + 2 = 100 \div 2 = 50$

$x^2 + 2x + 2 - 50 = 0$

$x^2 + 2x - 48 = 0$

$(x - 8)(x + 6) = 0$

$x = 8$ or $x = -6$ refused

$\therefore x = \boxed{8}$, $x + 2 = \boxed{10}$

5) Let width be x and length x + 3

$A = x(x + 3) = 28$

$x^2 + 3x = 28$

$x^2 + 3x - 28 = 0$

$(x + 7)(x - 4) = 0$

$x = -7$ refused or $x = 4$

$\therefore$ width = 4 cm

length = 4 + 3 = 7 cm

6) Let the number be 2x , 3x

$(2x)(3x) - 2(3x) = 12$

$6x^2 - 6x = 12$

$6x^2 - 6x - 12 = 0$

$6(x^2 - x - 2) = 0$

$x^2 - x - 2 = 0$

$(x - 2)(x + 1) = 0$

$x = 2$, $x = -1$ refused

$\therefore L = 3x = 3 \times 2 = 6$ cm

$w = 2x = 2 \times 2 = 4$ cm

7) as no. (5)

8) A. of square = x^2

A. of rectangle = 2x

$x^2 + 2x = 15$

$x^2 + 2x - 15 = 0$

$x = -5$ refused or $x = 3$

$\therefore$ P. of square = 5 × 4 = 12 cm

(2) Complete:

1) $\frac{1}{2\sqrt{2}}$ 2) 5 3) $\frac{9}{4}$

4) 2 5) 4 6) 8

7) $(-\sqrt{11})^{24}$ 8) zero 9) 1

10) 20 11) 1 12) –1

13) $1 + x^2$ 14) 1 15) 2

16) $2^{-5} \div (2^2)^{-3} = 2^{-5} \div 2^{-5} = 2^{zero} = \boxed{1}$

17) $3^{-6} \div 3^{-6} \times (-2)^{-1} = 1 \times -\frac{1}{2} = -\frac{1}{2}$

18) $(2)^7 \div 1 = 2^7$

19) $3 \times 3^x = 1$

$3^{x+1} = 3^0$ then $x = -1$

20) $\frac{2^x \times 3^x}{2^{2x} \times 3^x} = 2^{x-2x} = 2^{-1}$

$-x = -1 \rightarrow \boxed{x = 1}$

(3) Choose:

1) c	2) a	3) c	4) c	5) c
6) a	7) b	8) d	9) a	10) d
11) c	12) b	13) c	14) a	15) a
16) a	17) a	18) b	19) c	20) d
21) a				

(3) Answer the following question:

(1) 1) $\frac{1}{3}$ 2) 4 3) $\frac{8}{27}$ 4) 25 5) $\frac{1}{9}$

6) $\frac{1}{7}$ 7) $\frac{1}{8}$ 8) $\frac{1}{0.0001}$ 9) $\frac{16}{4} = 4$

(2) 1) $\frac{1}{9}$ 2) $-\frac{1}{4}$ 3) $2\sqrt{2}$

4) $\left(\frac{3}{\sqrt{3}}\right)^5 = \frac{243}{9\sqrt{3}} = \frac{27}{\sqrt{3}}$ 5) $\frac{4}{9}$ 6) 9

(3) Simplify:

1) $(\sqrt{2})^6 = 2^3 = 8$ 2) $(-\sqrt{5})^4 = 5^2 = 25$

3) 4×9 4) $(3)^2 \times (-2\sqrt{2})^2 = 9 \times 8 = 72$

5) $\frac{16 \times 4}{81 \times 9} = \frac{64}{729}$ 6) $\frac{(\sqrt{3})^{15}}{(\sqrt{3})^6} = (\sqrt{3})^9 = 81\sqrt{3}$

(4) Simplify each of the following in simplest form:

1) $\frac{(\sqrt{3})^{-9}}{(\sqrt{3})^{-10}} = \sqrt{3}$

2) $\frac{(10)^{-5}}{(0.1)^2 \times (0.1)^3} = \frac{(10)^{-5}}{(0.1)^5}$

$= (10)^{-5} \times (10)^5 = (10)^{zero} = 1$

3) $(\sqrt{2})^{-4} \times (3)^{-3} = \frac{1}{4 \times 27} = \frac{1}{108}$

4) $(\sqrt{3})^2 \times (\sqrt{2})^1 = 9\sqrt{2}$

(5) a) $(3)^{-2} \times (\sqrt{2})^{-4} = \frac{1}{9 \times 4} = \frac{1}{36}$

b) $\left((3)^{-2} \times (\sqrt{2})^4\right)^{-2} = (3)^4 \times (\sqrt{2})^{-8} = \frac{81}{16}$

c) $\left(\frac{3}{\sqrt{2}}\right)^{-3} = \left(\frac{\sqrt{2}}{3}\right)^3 = \frac{2\sqrt{2}}{27}$

(6) $\left(\frac{\sqrt{3}}{2}\right)^2 + \frac{\sqrt{3}}{2} \times \frac{\sqrt{2}}{2} \times \left(\frac{1}{\sqrt{3}}\right)^2$

$\frac{3}{4} + \frac{\sqrt{6}}{12} = \frac{9+\sqrt{6}}{12}$

(7) i) $(2+\sqrt{3})^4\,(2-\sqrt{3})^4$

$[(2+\sqrt{3})(2-\sqrt{3})]^4 = [4-3]^4 = 1$

ii) $\left(\frac{2+\sqrt{3}}{2-\sqrt{3}}\right)^{-2}$

$= \frac{(2-\sqrt{3})^2}{(2+\sqrt{3})^2} = \frac{4-2\sqrt{3}+3}{4+2\sqrt{3}+3} = \frac{7-2\sqrt{3}}{7+2\sqrt{3}}$

(8) $7 \times \left(\frac{1}{\sqrt{2}}\right)^6 + (1+1)^{-3}$

$\frac{7}{8} + \frac{1}{8} = \frac{8}{8} = 1$

(9) i) $(\sqrt{3})^4 - (\sqrt{2})^4 = 9 - 4 = 5$

ii) $\frac{(\sqrt{3})^4}{(\sqrt{2})^4} = \frac{9}{4}$

(10) $\left((2\sqrt{2})^2 - (3)^2\right)^3$

$(8-9)^3 = -1$

(11) $\left(\frac{\sqrt{3}}{\sqrt{2}}\right)^x = \left(\frac{\sqrt{3}}{\sqrt{2}}\right)^{-4}$

$\left(\frac{2}{3}\right)^{x+1} = \left(\frac{2}{3}\right)^{-4+1} = \left(\frac{2}{3}\right)^{-3} = \frac{27}{8}$

(12) $5\left(\frac{\sqrt{3}}{2\sqrt{5}}\right)^2 + \left(\frac{1}{\sqrt{2}}\right)^4$

$= 5 \times \frac{3}{20} + \frac{1}{4}$

$\frac{3}{4} + \frac{1}{4} = \frac{4}{4} = 1$

(13) $\sqrt{\left(2\sqrt{3}\right)^2 + \left(\frac{4}{\sqrt{2}}\right)^4 + 3}$

$= \sqrt{12 + 64 + 3} = \sqrt{79}$

(14) Find the value of X in each of the following:

1) x = 5 2) x = 3 3) x = 6

4) x = 5 5) x = 0 6) x = 2

(15) $\frac{(3^3)^{x-1} \times (2^3)^x}{2^{2x} \times (\sqrt{2})^{2x} \times 3^{2x} \times (\sqrt{2})^{2x}}$

$= \frac{3^{3x-3} \times 2^{3x}}{2^{2x} \times 2^x \times 3^{2x} \times 2^x}$

$= 3^{3x-3-2x} \times 2^{3x-2x-x-x}$

$= 3^{x-3} \times 2^{-x}$

(16) $\frac{2^{3x} \times 3^{2x}}{2^x \times 3^{2x}} = 64$

$= 2^{3x-x} \times 3^0$

$= 2^{2x} = 2^6$

$= \boxed{x = 3} \rightarrow$

$4^{-x} = 4^{-3} = \frac{1}{64}$

(17) $\frac{(2^2)^{x+1} \times (3^2)^{2-x}}{2^{2x} \times 3^{2x}}$

$= 2^{2x+2-2x} \times 3^{4-2x-2x}$

$= 2^2 \times 3^{4-4x} = 4 \times 3^{4-4} = \boxed{4}$

(18) The total area of cube $= \ell^2 \times 6 = 3.375 \times 10^2$

$\ell = \sqrt{3.375 \times 10^2 \div 6} = 7.5$ cm

The volume $= \ell^3 = (7.5)^3 = 421.9 \text{ cm}^3$

(19) $v = \frac{4}{3} \times \frac{22}{7} \times r^3 = 3.8808 \times 10^4$

$r^3 = 3.8808 \times 10^4 \times \frac{3}{4} \times \frac{7}{22}$

$r = \sqrt{9.261} = 3.04$ cm



Choose the correct answer :

1. $(x+2)^2 = \dots\dots$
   (a) x^2+4 (b) x^2-4 (c) x^2+4x+4 (d) x^2-4x+4

2. The S.S. of the equation : $x^2=9$ in $\mathbb{N}$ is $\dots\dots$
   (a) $\varnothing$ (b) $\{-3\}$ (c) $\{3\}$ (d) $\{-3 , 3\}$

3. If $(x+1)^2$ is one of the factors of the expression $(x^2-1)^2$, then the other factor is $\dots\dots$
   (a) $(x-1)^2$ (b) $x-1$ (c) x^2+1 (d) x^2-1

4. The expression : $x^2+kx+36$ is a perfect square when k equals $\dots\dots$
   (a) ± 6 (b) ± 8 (c) ± 12 (d) ± 18

5. If $x^3 y^{-3} = 8$, then $\frac{y}{x} = \dots\dots$
   (a) $\frac{1}{512}$ (b) $\frac{1}{8}$ (c) $\frac{1}{2}$ (d) 2

6. The expression : x^2+4x+a is a perfect square when a equals $\dots\dots$
   (a) 3 (b) 4 (c) 8 (d) 16

7. The S.S. of the equation : $x^2-x=0$ is $\dots\dots$ where $x \in \mathbb{R}$
   (a) $\{0\}$ (b) $\varnothing$ (c) $\{0 , 1\}$ (d) $\{1\}$

8. The S.S. of the equation : $x^2-5x+6=0$ is $\dots\dots$ where $x \in \mathbb{R}$
   (a) $\{1 , 6\}$ (b) $\{-1 , -6\}$ (c) $\{2 , 3\}$ (d) $\{-3 , -2\}$

9. The solution set of the equation : $x^2+25=0$ in $\mathbb{R}$ is $\dots\dots$
   (a) $\{-5 , 5\}$ (b) $\{5\}$ (c) $\{-5\}$ (d) $\varnothing$

10. If the expression : $x^2 + ax + 9$ is a perfect square , then a = ………
(a) 3 (b) 6 (c) 9 (d) 18

11. If $(x - 1)$ is one factor of expression : $x^2 - 4x + 3$, then the other factor is ………
(a) $x + 3$ (b) $x + 1$ (c) $x - 3$ (d) $x - y$

12. If $\left(\frac{5}{3}\right)^x = \left(\frac{3}{5}\right)^2$, then x = ………
(a) -2 (b) 2 (c) $\frac{1}{2}$ (d) $-\frac{1}{2}$

13. If $6^x = 7$, then 6^{x+1} = ……………
(a) 42 (b) $\frac{7}{6}$ (c) 1 (d) 6

14. $4^3 + 4^3 + 4^3 + 4^3$ = ……………
(a) 4^{12} (b) 4^9 (c) 4^4 (d) 4^{81}

15. The solution set of equation : $x^2 - 5x + 4 = 0$ in $\mathbb{R}$ is ……………
(a) $\{1 , 4\}$ (b) $\{2 , -2\}$ (c) $\varnothing$ (d) $\{1\}$

16. ✱ If $x^2 + kx + 25$ is a perfect square , then k = ……………
(a) 5 (b) 10 (c) ± 10 (d) ± 5

17. If $6^x = 7$, then 6^{x+1} = ……………
(a) 8 (b) 13 (c) 36 (d) 42

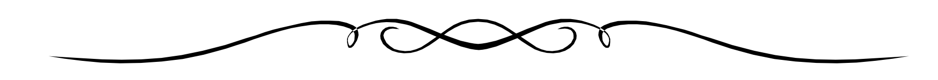
18. If the expression : $ax^2 + 12x + 9$ is a perfect square , then a = ……………
(a) 3 (b) 4 (c) 9 (d) 16

19. If $xy = 3$, $(x + y)^2 = 16$, then $x^2 + y^2$ = ……………
(a) 4 (b) 10 (c) 13 (d) 8

20. $3^{\text{zero}} + 3^{-1} - \left(\frac{1}{\sqrt{3}}\right)^2$ = ……………
(a) 3 (b) 1 (c) $\frac{1}{3}$ (d) 0

21. ✱ If $x + y = 3$, $x^2 - xy + y^2 = 5$, then $x^3 + y^3$ = ……………
(a) 15 (b) 25 (c) 8 (d) 7

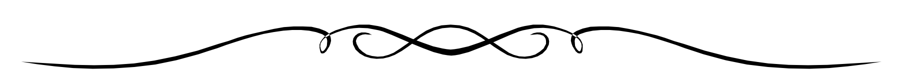
22.	If $(x-2)^0 = 1$, then $x \neq$ .... (a) 3 (b) 2 (c) 1 (d) −3
23.	If $5^{x} = 4$, then $5^{x-1} =$ .... (a) 1.25 (b) 0.8 (c) 0.125 (d) 0.08
24.	If $x = \frac{\sqrt{8}}{\sqrt{2}}$, then $x^{-1} =$ .... (a) 2 (b) − 2 (c) $\frac{1}{2}$ (d) $\frac{-1}{2}$
25.	$\left(\frac{\sqrt{5}}{3}\right)^{-2} =$ .... (a) $\frac{9}{5}$ (b) $-\frac{9}{5}$ (c) $-\frac{5}{9}$ (d) $\frac{5}{9}$
26.	✱ If the expression : $x^2 + 7x + a$ can be factorized , then a may be equal to .... (a) 8 (b) 10 (c) 18 (d) 49



Complete each of the following :

1.	Letters of the word "Alminsora" are written in cards. If a card is drawn at random , then the probability that chosen card carries the letter "S" = ...
2.	If $x + y = 4$, $x - y = 2$, then $x^2 - y^2 =$ ....
3.	The solution set of the equation : $x^2 - 1 = 8$, where $x \in \mathbb{Z}$ is ....
4.	If $2^{x} = 3$, then $8^{-x} =$ ....
5.	The S.S. of the equation : $x^2 - 3 = 0$ in $\mathbb{R}$ ....
6.	$(9a^2 - 4b^2) = (3a -$ ....) (............... $+ 2b)$
7.	$x^3 -$ .... $= (x-2)($ .... $+ 2x + 4)$
8.	$(5x - 2y)(25x^2 + 10xy + 4y^2) =$ ....
9.	The S.S. of the following equation : $(x^2 + 3)(x^3 + 1) = 0$ in $\mathbb{R}$ is ....

10.	A bag contains 9 cards labeled by numbers from 1 to 9 , a card is drawn randomly , then the probability that the card carries an odd number is ……………
11.	$x^2 - y^2 = ($…………… − ……………$)\ ($…………… + ……………$)$
12.	$y^3 - 8 = ($…………… − ……………$)\ (x^2 + 2x +$ ……………$)$
13.	$x^2 - 5x + 6 = (x -$ ……………$)\ ($…………… $- 3)$
14.	$(a + b)x + (a + b)y = (a +$ ……………$)\ ($…………… + ……………$)$
15.	Fifth the number 5^{20} is ……………
16.	If $3^x = 5$, then $(27)^x =$ ……………
17.	The solution set of the equation : $x^2 + 1 = 0$ in $\mathbb{R}$ is ……………
18.	If three times a number $= 3^3$, then $\frac{2}{3}$ this number = ……………
19.	If $x + y = 7$ and $a - 2b = 4$, then the numerical value of the expression : $a(x + y) - 2b(x + y) =$ ……………
20.	If $\left(\frac{2}{3}\right)^x = \frac{27}{8}$, then $x =$ ……………
21.	If $x^3 y^{-3} = 8$, then $\frac{y}{x} =$ ……………
22.	If $5^{x-2} = 1$, then $x =$ ……………
23.	The S.S. of the equation : $x^2 - 16 = 0$ in $\mathbb{R}$ is ……………
24.	The number $\left(\sqrt{2}\right)^{-4}$ in simplest form is ……………
25.	If $x = \left(\sqrt{5} - 2\right)^7$ and $y = \left(\sqrt{5} + 2\right)^7$, then $xy =$ ……………
26.	The solution set of the equation : $x^2 + 9 = 0$ in $\mathbb{R}$ is ……………
27.	The age of a man now x years, then his age 7 years ago is …………… years.



Essay problems:

1.	**Factorize each of the following expressions :** (1) $x^2+8x+15$ (2) $2x^2+7x+3$ (3) x^3-1 (4) $ax-7a+3x-21$
2.	**Simplify to the simplest form :** $\frac{4^n \times 6^{2n}}{2^{4n} \times 3^{2n}}$
3.	**Find the S.S. for the following equation where** $x \in \mathbb{R}$ **:** $x^2-8x+12=0$
4.	**If** $3^x=27$, $4^{x+y}=1$ **, find the values of :** x and y
5.	Find the real number whose double is increased by 1 than its multiplicative inverse.
6.	**Factorize each of the following :** (1) $4x^2-9$ (2) x^3+8 (3) x^2-5x (4) x^2-x-6
7.	**Find in** $\mathbb{R}$ **the S.S. of the following equation :** $x^2-x-6=0$
8.	**Simplify to the simplest form :** $\frac{(\sqrt{2})^5 \times 3^{-2}}{3 \times (\sqrt{2})^9}$
9.	**Factorize each of the following completely :** (1) ✱ $3a^2+7a+2$ (2) $5l+10m+al+2am$
10.	**Find the value of the** x **in each of the following :** (1) $(x-3)^7=128$ (2) $4^{2x-1}=1024$ (3) $5^{x-7}=1$
11.	**Simplify each of the following :** (1) $\frac{(\sqrt{3})^{-4} \times (\sqrt{2})^{-5} \times (\sqrt{3})^{-3}}{(\sqrt{3})^{-9} \times (\sqrt{2})^{-7}}$ (2) $\left(\frac{2\sqrt{3}}{3\sqrt{2}}\right)^4$
12.	**Find in** $\mathbb{R}$ **the solution set of each of the following :** (1) $x^2-9=0$ (2) $x^2=5x$ (3) $3x=-x^2-2$
13.	**Simplify to the simplest form :** $(3^{x-1} \times 2^{x+1}) \div 6^{x-1}$

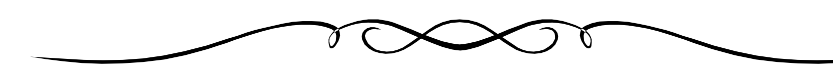
14.	If $a = \sqrt{3}$, $b = \frac{1}{\sqrt{3}}$, **find the value of :** $a^4 + b^{-4}$
15.	If $\frac{9^x \times 8^x}{18^x} = 64$, **find the value of :** x
16.	The length of a rectangle is more than its width by 5 cm. If its area is 36 cm^2 **, then find its dimensions and its perimeter.**
17.	**Simplify :** $\frac{4^{x+1} \times 9^{2-x}}{6^{2x}}$, then find the value of the answer when $x = 2$
18.	**Find the value of x if :** $3^{2x-3} = 243$
19.	If a real number is added to its square the result will be 12 , find this number.
20.	If $\frac{8^x \times 9^x}{18^x} = 64$, **find :** x



Choose the correct answer :

1.	If $\frac{26}{x} + 1 = 14$, then $x =$ …………… (a) 2 (b) 10 (c) 13 (d) 20
2.	If $3^{2n-5} = 1$, then $2n =$ …………… (a) 5 (b) -10 (c) 10 (d) zero
3.	✱ If $x^3 + 27 = (x + 3)(x^2 + k + 9)$, then $k =$ …………… (a) $-6x$ (b) $-3x$ (c) $3x$ (d) $6x$
4.	The value of $(2)^{20} + (2)^{21} =$ …………… (a) 2^{41} (b) 4^{41} (c) 3×2^{20} (d) 3×2^{21}
5.	If $(x + 3)^{zero} = 1$, then $x \in$ …………… (a) 3 (b) $\{-3\}$ (c) $\mathbb{R} - \{3\}$ (d) $\mathbb{R} - \{-3\}$
6.	✱ If $x^2 + kx - 21 = (x - 3)(x + 7)$, then $k =$ …………… (a) -4 (b) 4 (c) 8 (d) 20
7.	If $6^x = 7$, then $6^{x+1} =$ …………… (a) 8 (b) 13 (c) 36 (d) 42
8.	If the product of multiplying four by a number equals 48 , then the third of this number = …………… (a) 4 (b) 8 (c) 12 (d) 16
9.	The value of $2^5 + (\sqrt{2})^{10} =$ …………… (a) 2^6 (b) 2^{10} (c) $(\sqrt{2})^{15}$ (d) $(\sqrt{2})^{20}$

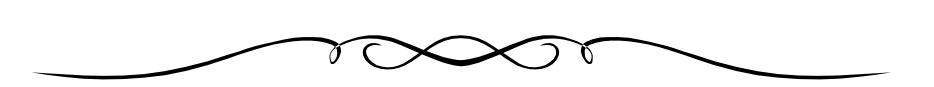
10.	The S.S. of the equation : $x^3 + 9x = 0$ in $\mathbb{R}$ is .... (a) $\{0, 3\}$ (b) $\{0\}$ (c) $\{0, 3\}$ (d) $\{0, 3, -3\}$
11.	If $2^x = 5$, then $8^x =$ .... (a) $\frac{5}{8}$ (b) 25 (c) 125 (d) $\frac{64}{125}$
12.	✱ If $y^3 - a = (y - 2)(y^2 + 2y + 4)$, then a = ... (a) 2 (b) 4 (c) 8 (d) – 8
13.	If $5^x = 2$, then $5^{x+2} =$ .... (a) 25 (b) 2 (c) 50 (d) 100
14.	✱ If $x^2 - a = (x - 3)(x + 3)$, then a = ... (a) 3 (b) –3 (c) 9 (d) –9
15.	$4^3 + 4^3 + 4^3 + 4^3 =$ .... (a) 4^3 (b) 4^4 (c) 4^{12} (d) 4^{81}
16.	✱ If the expression : $x^2 + 14x + b$ is a perfect square , then b = ... (a) 2 (b) 7 (c) 14 (d) 49



Complete each of the following :

1.	If $3^{x-2} = 27$, then $x =$ ....
2.	$\left(\frac{-2}{3}\right)^0 =$ ....
3.	The S.S. of the equation : $x^2 + 9 = 0$ in $\mathbb{R}$, is ....
4.	If $6^x = 3$, then $6^{x+1} =$ ....
5.	If $3^{x-1} = 27$, then $x =$ ....
6.	$a + b = 2(x + y) = 14$, then $a(x + y) + b(x + y) =$ ....
7.	$4a(x + y) - 3b(x + y) = (x + y)$ (............... – ....)

8. If $3^x = 27$, then $x =$ ....



Essay problems:

1.

$x^3 + 2x^2 + 4x + 8$

....

....

....

$25a^4 - 1$

....

$x^3 - 27$

....

$y^2 - 7y - 8$

....

$25x^2 - 30x + 9$

....

2. If $\left(\frac{3}{5}\right)^{x-2} = \frac{27}{125}$ **Find the value of :** x

....

....

....

3. If $\frac{8^x \times 9^x}{18^x} = 64$ **Find the value of :** x

....

....

....

4. If $\left(\sqrt{\frac{2}{3}}\right)^x = \frac{4}{9}$ **Find the value of :** $\left(\frac{2}{3}\right)^{x-1}$

....

....

....

5. **Find in $\mathbb{R}$ the S.S. of the equation :** $x(x+4)(2x-1)=0$

....

6. If $\left(\frac{2}{5}\right)^{2x-1}=\frac{8}{125}$ **Find the value of :** x

....

....

....

7. A positive real number if you add its square to its three times the result will be 28 find the number.

....

....

....

8. **Find in $\mathbb{R}$ the S.S. of :** $x^2-8x=-15$

....

....

9. **Prove that :** $\frac{(27)^{x-1}\times 8^{x}}{\left(2\sqrt{3}\right)^{2x}\times\left(3\sqrt{2}\right)^{2x}}=\frac{1}{27}$

....

....

....

10. **Simplify :** $\frac{4^{n}\times 6^{2n}}{2^{4n}\times 3^{2n}}$

....

....

....

First: Algebra

(1) c (2) c (3) a (4) c
(5) c (6) b (7) c (8) c
(9) d (10) b (11) c (12) a
(13) a (14) c (15) a (16) c
(17) d (18) b (19) b (20) b
(21) a (22) b (23) b (24) c
(25) a (26) b

Complete:

① $\frac{1}{9}$ ② 8 ③ $\{\pm 3\}$
④ $\frac{1}{27}$ ⑤ $\{\pm\sqrt{3}\}$ ⑥ 2b, 3a
⑦ $8, x^2$ ⑧ $125x^3 - 8y^3$ ⑨ $\{-1\}$
⑩ $\frac{5}{9}$ ⑪ $(x-y)(x+y)$
⑫ $(y-2)(y^2-2y+4)$
⑬ 2, x ⑭ b, x, y ⑮ 5^{19}
⑯ 125 ⑰ ϕ ⑱ 6
⑲ 28 ⑳ −3 ㉑ $\frac{1}{2}$
㉒ 2 ㉓ $\{\pm 4\}$ ㉔ $\frac{1}{4}$
㉕ 1 ㉖ ϕ ㉗ $x-7$

Essay Problems:

① (1) $(x-3)(x+5)$
(2) $(2x+1)(x+3)$
(3) $(x-1)(x^2+x+1)$
(4) $(ax-7a)+(3x-21)$
$= a(x-7)+3(x-7)$
$= (x-7)(a+3)$

② $\frac{4^n \times 6^{2n}}{2^{4n} \times 3^{2n}} = \left(\frac{4 \times 6^2}{2^4 \times 3^2}\right)^n = 1^n = 1$

③ $(x-2)(x-6)=0$
S.S. $= \{2, 6\}$

④ $3^x = 3^3$, $4^{3+y} = 4^0$
$x=3$ $3+y=0$ $y=-3$

⑤ let the number is x
$2x - \frac{1}{x} = 1$ $(\times x)$
$2x^2 - 1 - x = 0$
$2x^2 - x - 1 = 0$
$(2x+1)(x-1)=0$
$x = \frac{-1}{2}$ or $x=1$
∴ the number is $\frac{-1}{2}$ or 1

⑥ (1) $(2x-3)(2x+3)$
(2) $(x+2)(x^2-2x+4)$
(3) $x(x-5)$
(4) $(x+2)(x-3)$

⑦ $(x+2)(x-3)=0$
S.S. $= \{-2, 3\}$

⑧ $(\sqrt{2})^{5-9} \times 3^{-2-1} = (\sqrt{2})^{-4} \times 3^{-3}$
$= \frac{1}{2^2} \times \frac{1}{3^3} = \frac{1}{4} \times \frac{1}{27} = \frac{1}{108}$

⑨ (1) $(3a+1)(a+2)$
(2) $(5l+10m)+(al+2am)$
$= 5(l+2m)+a(l+2m)$
$= (l+2m)(a+5)$

⑩ (1) $(x-3)^7 = 2^7$
$x-3=2$ $x=5$
(2) $4^{2x-1} = 4^5$
$2x-1=5$ $x=3$
(3) $5^{x-7} = 5^0$
$x-7=0$ $x=7$

(11) $(\sqrt{3})^{-4-3+9} \times (\sqrt{2})^{-5+7} = (\sqrt{3})^2 \times (\sqrt{2})^2$

$= 3 \times 2 = 6$

(12) $\frac{2^4 \times \sqrt{3}^4}{3^4 \times \sqrt{2}^4} = \frac{2^4 \times 3^2}{3^4 \times 2^2} = 2^2 \times 3^{-2}$

$= 4 \times \frac{1}{9} = \frac{4}{9}$

(13) $\frac{3^{x-1} \times 2^{x+1}}{3^{x-1} \times 2^{x-1}} = 2^{x+1-x+1} = 2^2 = 4$

(14) $(\sqrt{3})^{+1} + \left(\frac{1}{\sqrt{3}}\right)^{-4} = 3^2 + 3^2 = 18$

(15) $\left(\frac{9 \times 8}{18}\right)^x = 4^x \quad \therefore 4^x = 4^3$

$\therefore \boxed{x = 3}$

(16) let the width $= x$, Length $= x+5$

$x(x+5) = 36$

$x^2 + 5x - 36 = 0$

$(x+9)(x-4) = 0$

$x = -9$ neglected

or $\boxed{x = 4}$

$\therefore$ the width $= 4$ cm, Length $= 9$ cm

$\therefore P = (4+9) \times 2 = 26$ cm

(17) $\frac{(2^2)^{x+1} \times (3^2)^{2-x}}{2^{2x} \times 3^{2x}} = \frac{2^{2x+2} \times 3^{4-2x}}{2^{2x} \times 3^{2x}}$

$= 2^{2x+2-2x} \times 3^{4-2x-2x}$

$= 2^2 \times 3^{4-4x} = 4 \times 3^{-4} = \frac{4}{81}$

(18) $3^{2x-3} = 3^5$

$\therefore 2x - 3 = 5 \quad \boxed{x = 4}$

No pain, No gain

(19) Let the number is x

$x^2 + x = 12$

$x^2 + x - 12 = 0$

$(x+4)(x-3) = 0$

$x = -4$ or $x = 3$

$\therefore$ the number is -4 or 3

(20) As No. (15)

Second: Geometry

(1) c	(2) b	(3) c	(4) b
(5) a	(6) b	(7) d	(8) b
(9) b	(10) d	(11) c	(12) b
(13) b	(14) d	(15) a	(16) d
(17) b	(18) b	(19) c	(20) a
(21) c	(22) c	(23) a	(24) d
(25) b	(26) a	(27) c	(28) b
(29) c	(30) b	(31) a	(32) a
(33) b	(34) c	(35) c	(36) b
(37) c	(38) b	(39) b	(40) c

Complete:

(1) the same area (2) $m(\angle C)$

(3) the point A (4) 3.5 cm

(5) 45 cm² (6) Proportional, equal in measure

(7) 6 cm (8) B (9) obtuse

(10) base and lie between two Parallel straight line

(11) a Point (12) >

(13) 32 (14) are equal in area

(15) base (16) an obtuse

(27) In $\triangle BCD$, $\because m(\angle C) = 90^\circ$

$\therefore (BD)^2 = (BC)^2 + (DC)^2 = 100$

$\therefore BD = 10$ cm

$\because AB = AD$, E is midpoint of $\overline{BD}$

$\therefore \overline{AE} \perp \overline{BD}$

In $\triangle ABE$, $\because m(\angle E) = 90^\circ$

$\therefore (AE)^2 = (AB)^2 - (BE)^2 = 169 - 25 = 144$

$\therefore AE = \sqrt{144} = 12$ cm

$\therefore A. \triangle BCD = \frac{1}{2} \times 8 \times 6 = 24\ cm^2$

$A. \triangle ABD = \frac{1}{2} \times 10 \times 12 = 60\ cm^2$

$\therefore$ A. of $ABCD = 24 + 60 = 84\ cm^2$

(28) $BC = 20$ cm

$2AD = 20 \quad \therefore AD = 10$ cm

middle base $= \frac{20+10}{2} = 15$ cm

$\therefore h = 180 \div 15 = 12$ cm

(29) As No. (18)

Algebra

Essay

(21)
- $(x^3 + 8) + (2x^2 + 4x)$
  $= (x+2)(x^2 - 2x + 4) + 2x(x+2)$
  $= (x+2)(x^2 - 2x + 4 + 2x)$
  $= (x+2)(x^2+4)$
- $(5a^2 - 1)(5a^2 + 1)$
- $(x-3)(x^2 + 3x + 9)$
- $(y-8)(y+1)$
- $(5x-3)^2$

(22) $\left(\frac{3}{5}\right)^{x-2} = \left(\frac{3}{5}\right)^3$

$\therefore x - 2 = 3 \quad \boxed{\therefore x = 5}$

(23) $\left(\frac{8 \times 9}{18}\right)^x = 64$

$4^x = 4^3 \quad \therefore \boxed{x = 3}$

(24) $\left(\sqrt{\frac{2}{3}}\right)^x = \left(\sqrt{\frac{2}{3}}\right)^4$

$\therefore \boxed{x = 4}$

$\therefore \left(\frac{2}{3}\right)^{x-1} = \left(\frac{2}{3}\right)^3 = \frac{8}{27}$

(25) S.S. $= \{0, -4, \frac{1}{2}\}$

(26) $\left(\frac{2}{5}\right)^{2x-1} = \left(\frac{2}{5}\right)^3$

$\therefore 2x - 1 = 3$

$\therefore \boxed{x = 2}$

(27) $x^2 + 3x = 28$

$x^2 + 3x - 28 = 0$

$(x+7)(x-4) = 0$

$x = -7$ neglected

or $x = 4$

$\therefore$ the number is 4

(28) $x^2 - 8x + 15 = 0$

$(x-3)(x-5) = 0$

$\therefore$ S.S. $= \{3, 5\}$

(29) $\frac{(27)^{-1} \times 27^x \times 8^x}{(2\sqrt{3})^{2x} \times (3\sqrt{2})^{2x}}$

$= (27)^{-1} \times \left(\frac{27 \times 8}{12 \times 18}\right)^x = \frac{1}{27} \times 1 = \frac{1}{27}$

(30) $\left(\frac{4 \times 36}{16 \times 9}\right)^n = 1^n = 1$

Part (1)

(1) Complete the following:

1) (a – 2) (2a – 3) = ……. – 7a + …….

2) (X + …….) (2X – 3) = ……. + ……. – 15

3) (X + …….) (3 X – 2) = ……. + ……. – 10

4) (2X + 3Y) (……. + 2Y) = $2X^2$ + ……. + …….

5) (2a + …….) (……. + 3b) = ($2a^2$+ ……. + $3b^2$)

6) $3a^2 + 7a + 2$ = (3a + …….) (a+ …….)

7) ….. X^2 + 5X – 12 = (2X – 3) (…… …… ……)

8) X^3 – …… = (X – ……) (…… + …… + 4)

9) $(X – Y)^2$ + 4XY = (…… + ……)^2

10) (5a – ……)^2 = …… – 30a + ……

11) (7X – 5Y) (……– ……) = $49X^2$ - …… + $25Y^2$

12) $11X^2$ – 4XY – …… = (X – Y) (…… + ……)

13) …… – $49X^2$ = (3 – ……) (3 + ……)

14) $9X^2$ – 3X = 3X (3X – ……)

15) $8a^3 – b^3$ = (…… – b) ($4a^2$ + …… + ……)

16) $4X^2$ – …… + …… = (…… – 3Y)^2

17) The set values of a which make the expression: $X^2 + aX – 15$ can be factorized are ……………………..

18) The expression $4X^2 – 12X + K$ is a perfect square when K = ……

19) If the expression $121X^2 + KX + 100$ is perfect square when K = …….

20) The expression : $9X^2 – 30X + a$ is perfect square when a= …….

21) If $X^2 – Y^2 = 35$, X – Y = 5 then X + Y = ……...





22) If the expression: $X^2 + aX – 15$ can be factorized then the negative values of a are ……....

23) If $a^2 + b^2 = 7$, $ab = 3$ then $(a – b)^2$ = ……...

24) The expression $25a^2 + 10a + m$ is a perfect square when m= …...

25) If $x^2 – K + 10 = (X – 3) (X + 3)$ then K = ……...

26) If the expression $X^2 + mX + 16$ is a perfect square then m = …...

27) If : $X^2 + K + 17 = (X – 5) (X + 5)$ then K= …...

28) If : $X + \frac{1}{X} = 5$ then $X^2 + \frac{1}{X^2}$ = …... where $X \neq$ zero.

29) If the perimeter of the square equals 2X cm then its area equals …...

30) If $(X – 3)$ is one of the two factors of the expression $X^2 + 2X – 15$ then the other factor is …..............

31) If (-4) is one root of the two roots for the equation $X^2 + 3X – 4 = 0$ then the other root is …...

32) The solution set of the equation: $X^2 + 4 = 0$ is …...

33) The solution set of the equation: $X^2 – 1 = 0$ is …...

34) The simplest form of the algebraic expression $X (y – z) + L (y – z)$ is ………..

35) If the age of Kamal now is X year then his age after 5 years is …...

36) If $a (X + Y) – b (X + Y) = 15$ and $(X + Y) = 5$ the a – b = ……....

37) If $(X + 5)$ is one of the roots of $X^3 + 125$, the other root = …......

38) If $(X + Y)^2 = 42$, $X^2 + Y^2 = 12$ then XY = ……...

(2) Choose the correct answer:-

1) If X = 2 , Y = 5 then : $X^2 + 2XY + Y^2$ equals ……

a) 5 b) 7 c) 9 d) 49

2) $X^2 - 4$ equals : ……

a) $4 - X^2$ b) $(X - 2)^2$ c) $(X-2)(X+2)$ d) $(X - 4)^2$

3) $(a - 1)(a^2 + a + 1)$ equals ……

a) $a^3 - 1$ b) $a^3 + 1$ c) $(a - 1)^3$ d) $1 - a^3$

4) If $X^2 + Y^2 = 7$, XY = 3 then $(X - Y)^2$ equals ……

a) -1 b) 1 c) ± 1 d) 10

5) If $16X^2 + KX + 9$ is a perfect square then K equals ……

a) ± 6 b) ± 12 c) ± 24 d) ± 144

6) If $X^2 - 6X + K$ is a perfect square then K equals ……

a) 3 b) 6 c) 9 d) 36

7) If $KX^2 - 12X + 4$ is a perfect square then K equals ……

a) -6 b) -4 c) -2 d) 9

8) If $(a + b)^2 = 43$, $(a^2 + b^2) = 35$ then ab equals ……

a) 4 b) 8 c) 16 d) 78

9) If the expression $X^2 + KX - 42$ can be factorized, then K can't equal

a) -2 b) 2 c) 3 d) 5

10) If the expression $X^2 + KX + 2$ can be factorized then K equals

a) 1 b) 2 c) 3 d) 4

11) If $X^2 - Y^2 = 12$, X – Y = 3 then X + Y equals ……….

a) 3 b) 4 c) 12 d) 15

12) If $X^2 + KX - 6 = (X + 3)(X - 2)$ then K equals ……….

a) -1 b) 1 c) 2 d) 3

13) The expression $X^2 + 8X + C$ is a perfect square when C equals ….

a) 2 b) 4 c) 16 d) 64

14) If $(X + Y)^2 = 24$, $XY = 8$, then $X^2 + Y^2 =$ ……….

a) 8 b) 16 c) 24 d) 32

15) If $X^2 + KX - 21 = (X - 3)(X + 7)$ then K equals ……….

a) -4 b) 4 c) 8 d) 20

16) If $(X + Y)^2 = 10$, $(X^2 + Y^2) = 4$ then XY equals ……...

a) 2 b) 3 c) 6 d) 14

17) The expression: $(X - 2Y)(X^2 + 2XY^2 + 4Y^2)$ equals ………

a) $X^3 - 2Y^3$ b) $X^3 - 8Y^3$ c) $X^3 + 2Y^3$ d) $X^3 + 8Y^3$

18) If $64a^2 - 32a + K$ is a perfect square then K equals ……….

a) 1 b) 4 c) 11 d) 16

19) If $(X - Y) = 5$, $X^2 + XY + Y^2 = 7$ then $X^3 - Y^3$ equals ……..

a) 2 b) 7 c) 12 d) 35

20) The expression $X(Y + 3) + Z(Y + 3)$ equal ……….

a) $X + Y + Z + 6$ b) $(X + Z)(Y + 3)$

c) $(X + Z)(Y + 3)^2$ d) $(X + Z) \times 2(Y + 3)$

21) If $a^2 + 2ab + b^2 + 25$, then a + b equals ……….

a) -5 b) 5 c) ± 5 d) 625

22) If X = 13 , Y = 11 then $X^2 - 2XY + Y^2$ equals ……….

a) 2 b) 4 c) 24 d) 48

23) If $8X^3 + a^3 = (2X + a)(4X^2 - 4aX + a^2)$ then a equals ……….

a) 7 b) 14 c) 49 d) 343

24) The result of the expression: $(8X^3 - 27Y^3) \div (2X - 3Y)$ where $2X \neq 3Y$ equals ….

a) $4X^2 + 6XY + 6Y^2$ b) $4X^2 - 6XY + 6Y^2$

c) $4X^2 - 12XY + 9Y^2$ d) $4X^2 + 12XY + 9Y^2$

25) If $X^3 + 27 = (X + 3)(X^2 + K + 9)$ then K equals ……….

a) -6X b) -3X c) 3X d) 6X

26) If the expression $X^2 + aX + 9$ is a perfect square then a equals…

a) zero b) ± 3 c) ± 6 d) ± 12

27) If $X^3 - Y^3 = 26$, $X^2 + XY + Y^2 = 13$ then $X - Y =$ ……….

a) 2 b) 4 c) 13 d) 39

28) If 2 is a solution for the equation $x^2 - 5x + a = 0$ then a equals

a) -3 b) -6 c) 3 d) 6

29) If four times a number is 48 then one third of this number equals

a) 4 b) 8 c) 12 d) 16

30) The solution set of the equation: $(x - 1)^2 = 0$ is ……..

a) { 0 } b) { –1} c) {1 , –1} d) { 1 }

31) The dimension of a rectangle X cm, X + 1 cm and it area is 30 cm^2 then x = ………..

a) 3 b) 4 c) 5 d) 6

32) If the average of two numbers is 5 one of them if 3 then the other is ………….

a) 2 b) 4 c) 7 d) 13

33) If the age of Zyad now is X year then his age before three years was ……….

a) 3X b) 3 – X c) X – 3 d) X + 3

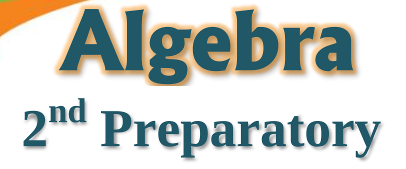
34) The area of a rectangle whose length X + Y and its width X – Y is ………..

a) 2X b) 4X c) $X^2 - Y^2$ d) $(X - Y)^2$

35) A natural number if we divide it by each of the numbers 2, 3, 4 then the remainder is 1 but if divide by 5 there is no remainder, then this number is ………..

a) 13 b) 15 c) 25 d) 35







(3) Factorize each of the following:

1) $X^2 - 7X - 8$

2) $Y^2 - 14Y + 49$

3) $2Y^4 + 3Y^2 - 5$

4) $3X^2 - 15X + 12$

5) $4X^2 - 20X + 25$

6) $X^6 - 9X^3 + 8$

7) $25X^3 - 10X^2Y + XY^2$

8) $X^2Y^2 - 24XY - 25$

9) $-19ab + 6b^2 + 15a^2$

10) $6X^2 - 13XY + 6Y^2$

11) $25a^4 - 1$

12) $25X^2Y - 15XY + 35XY$

13) $16X^4 - 81$

14) $X^3 + 64Y^3$

15) $\frac{1}{3}X^3 - 9$

16) $\frac{X^2}{4} - \frac{Y^2}{49}$

17) $12X^3Y^4 + 3X^5Y^2$

18) $8X^3 - 2Y^2X$

19) $2XY^3 - \frac{1}{8}X^3Y$

20) $2X^3Y - 8XY^3$

21) $\frac{3}{4}X^3 - 48$

22) $0.027a^3 - 0.001b^3$

23) $(a + b)^3 + C^3$

24) $(a - 2b)^3 - 4(a - 2b)$

25) $2 - 2(X - 1)^3$

26) $Y^3 - Y^2 - 9Y + 9$

27) $a^3 - ab^2 - a^2b + b^3$

28) $X^3 - 3X^2 - 6X + 8$

29) $4X^2 - 4XY - 16 + Y^2$

30) $3X^3 - 2X^2 + 12X - 8$

31) $(5X - 2)^2 - 4X - 5$

32) $(X - 2)(X + 3) - 6X$

33) $50 - 2(2X + 1)^2$

34) $5Y^2 - 4X(7Y + 3X)$

(4) Answer the following question:

1) Using the difference between two squares to evaluate $(23.5)^2 - (18.5)^2$

2) Using the factorization to evaluate $2(26.18)^2 - 2(23.82)^2$

3) Simplify to the simplest form: $(a - 2b)(a + 2b) + 5b^2$

4) Simplify to the simplest form: $X^2 (2X - 3) - 9 (2X - 3)$

5) Simplify: $(2a - b)^2 + (a + 2b)(a - b)$ then find the value when

   $a = 1, b = 2$

6) Simplify to the simplest form: $(2X - 3Y)^2 + (3X - 1)(3X + 1)$

7) Simplify to the simplest form: $(2a - 3b)(a + 2b) + a^2 - 2b^2$

8) If $(Y + 2)$ is one factor of the two factors of the expression

   $4Y^2 + Y - 14$ find the other factor.

9) If $(3a + 4b)$ is one factor of the expression $15a^2 + 17ab - 4b^2$

   find the other factor.

10) Using factorization to evaluate the value of X if: $(25)^2 - (15)^2 = 40X$

11) If : $X + Y = 7$, $a - 2b = 4$ find the numerical value of

   $a(X + Y) - 2b(X + Y)$.

12) Put in the simplest form: $(X - Y)(X + Y)(X^4 - 2X^2Y^2 + Y^4)$

13) If $X + \frac{1}{X} = 5$ then find $X^2 + \frac{1}{X^2}$

14) If $X^2 + \frac{1}{X^2} = 34$ find the value of $X + \frac{1}{X}$.

15) Find in R the S.S of the following equations:

   a) $X^2 = 4X$
   b) $4X^2 - 9 = 0$
   c) $16X^4 - 81 = 0$
   d) $X^2 - X - 12 = 0$
   e) $9 - (X + 1)^2 = 0$
   f) $X(X - 2) - 3(2 - X) = 0$
   g) $(4X - 1)(X + 3) - (X - 5)^2 + 4 = 0$
   h) $\frac{X-1}{7} = \frac{8}{X}$
   k) $X(X - 2) + 1 = 0$



Part (2)

(1) Answer the following questions:

1) A rectangle of area $x^3 - x^2 - 3x + 6$ and of length $x^2 - 3x + 3$ find its width in term of x then find its perimeter at x = 6 cm.

2) A rectangle of dimension (x + 1) cm, (x + 5) cm find its area and its perimeter.

3) A square of side length (5a + b) cm, where a, b $\in \mathbb{Z}^+$ find its area then find the numerical value of its area when a = 2 cm, b = 3 cm.

4) The sum of the squares of two consecutive even integers numbers is 100 find the two numbers.

5) The length of a rectangle is more than its width by 3 cm and its area 28 cm^2 find its dimension.

6) The ratio between two positive numbers is 2 : 3 and their product is more than twice the greater by 12 find the two numbers.

7) The length of a rectangle is more than its width by 5 cm and if its area 36 cm^2 find its perimeter.

8) A square of side length X cm and a rectangle of dimensions 2 cm, X cm if the sum of their areas is 15 cm^2 find the perimeter of the square.

(2) Complete the following:

1) The number $(\sqrt{2})^{-3}$ in the simplest form is ……………..

2) The number $\frac{1}{(\sqrt{5})^{-2}}$ in the simplest form is ……………..

3) $\left(\frac{2}{3}\right)^{-4} = \left(\frac{\dots\dots}{\dots\dots}\right)^{2}$

4) If $3^{x-2} = 1$ then x = ……………..

5) If $3^{x-1} = 27$ then x = ……………..

6) The simplest form the expression $\left(\sqrt{2}\right)^{zero} \times \left(\sqrt{2}\right) \times \left(\sqrt{2}\right)^{2} \times \left(\sqrt{2}\right)^{3}$ is …………..

7) The greater number $\left(-\sqrt{11}\right)^{24}$ or $\left(-\sqrt{11}\right)^{25}$ is …………..

8) The simplest form of the expression $\left(\left(\sqrt{7}\right)^{2}\right)^{3} - \left(\left(\sqrt{7}\right)^{3}\right)^{2}$ = ……….

9) The value of the expression $\sqrt[3]{\frac{216}{2^3 \times 3^3}}$ = …………..

10) If five times a number is 5^3 then $\frac{4}{5}$ of this number is …………..

11) The simplest form of the expression: $2^{zero} + (2)^{-1} - \left(\frac{-1}{\sqrt{2}}\right)^{2}$ = ………

12) If $X = \left(\sqrt{3} + 2\right)^{9}$, $Y = \left(\sqrt{3} - 2\right)^{9}$ then XY = …………..

13) $X^{-2} + 1 = X^{-2}$ (…… + ……) where $X \neq 0$

14) If $3^{x} \times 2^{-x} = 1.5$ then x = ………..

15) If $4^{x-10} = \frac{1}{16}$ then $\sqrt[3]{X}$ = …………

16) The simplest form of the expression: $2^{-3} \times (2)^{-2} \div 4^{-3}$ = ……….

17) The simplest form of the expression: $(3^{-2})^{3} \div 9^{-3} \times (-2)^{-1}$ = ……….

18) The simplest form of the expression: $(2^3 \times 2^{-2})^7 \div \left(\sqrt[3]{-8}\right)^{zero}$ = ……

19) If $3^{x} + 3^{x} + 3^{x} = 1$ then x = …………….

20) If $\frac{2^x \times 3^x}{(12)^x} = \frac{1}{2}$ then x = …………

(3) Choose the correct answer:

1) 3^{-2} equals ....

a) – 9 b) $-\frac{1}{9}$ c) $\frac{1}{9}$ d) 9

2) 0.002 × 0.05 equals ....

a) 10^{-5} b) 10^{-4} c) 10^{4} d) 10^{5}

3) What is the nearest value of $11^2 + 9^2$

a) 22 + 18 b) 211 + 29 c) 120 + 80 d) 120 + 20

4) The value of the expression $2^{20} + 2^{21}$ equals ....

a) 2×2^{40} b) 2×2^{41} c) 3×2^{20} d) 3×2^{21}

5) One sixth of the number: $2^{12} \times 3^{12}$ is ....

a) 6^2 b) 6^4 c) 6^{11} d) 6^{23}

6) The value of the expression: $2^5 + (\sqrt{2})^{10}$ equals

a) 2^6 b) 2^{10} c) $(\sqrt{2})^{15}$ d) $(\sqrt{2})^{20}$

7) $4^3 + 4^3 + 4^3 + 4^3$ equals ....

a) 4^3 b) 4^4 c) 4^{12} d) 4^{81}

8) $\left(\frac{\sqrt{5}}{3}\right)^{-2}$ equals ....

a) $-\frac{9}{5}$ b) $-\frac{5}{9}$ c) $\frac{5}{9}$ d) $\frac{9}{5}$

9) If X = $\frac{\sqrt{9}}{\sqrt{3}}$ then X^{-1} equals:

a) $\frac{\sqrt{3}}{3}$ b) $\frac{\sqrt{3}}{\sqrt{2}}$ c) $\sqrt{3}$ d) 2

10) If $6^x = 7$ then 6^{x+1} equals ....

a) 8 b) 13 c) 36 d) 42

11) If $3^x = 5$ then $(27)^x$ equals ....

a) 9 b) 25 c) 125 d) 729

12) If $5^x = 4$ then 5^{x-1} equals ………………

a) 1.25 b) 0.8 c) 0.125 d) 0.08

13) If $9^{8-2X} = 1$ then X equals ……………..

a) zero b) $\frac{1}{4}$ c) 4 d) 6

14) If $(X-5)^0 = 1$ then $X \in$ …………

a) $\mathbb{R} - \{5\}$ b) $\mathbb{R} - \{-5\}$ c) $\{5\}$ d) $\mathbb{R}$

15) If $5^{X-3} = 1$, then $(2X)^2$ equals ……………

a) 36 b) 9 c) 4 d) 3

16) $(\sqrt{3}+\sqrt{2})^9(\sqrt{3}-\sqrt{2})^9$ equals …………

a) 1 b) $\sqrt{5}$ c) $\sqrt{6}$ d) 5

17) If $3^X = 5$, $\frac{1}{3^Y} = 7$ then $3^{X+Y} =$ ……………..

a) $\frac{5}{7}$ b) $\frac{7}{5}$ c) 2 d) 12

18) If $2^{X-1} \times 3^{1-X} = \frac{9}{4}$ then X = ………

a) – 3 b) – 1 c) 1 d) 3

19) The numerical value of the expression $\frac{2^{2n+1} \times 5^{2n+1}}{10^{2n}}$

a) $\frac{1}{10}$ b) 7 c) 10 d) 100

20) The expression: $(5^{x+2} - 5^{x+1}) \div 5^x$

a) 5 b) 10 c) 15 d) 20

21) The expression: $\frac{3^x \times 3^x \times 3^x}{3^x + 3^x + 3^x}$

a) 3^{2x-1} b) 3^{1-2x} c) 3^{x^3-3x} d) 3^3

(4) Answer the following questions:

1) Find the value of the following in the simplest form:

1) 3^{-1} 2) $\left(\frac{1}{4}\right)^{-1}$ 3) $\left(\frac{3}{2}\right)^{-3}$

4) $\left(\sqrt{5}\right)^{4}$ 5) $\left(-\sqrt{3}\right)^{-2}$ 6) $\left(\sqrt[3]{7}\right)^{-3}$

7) $\left(\frac{-1}{\sqrt{2}}\right)^{6}$ 8) $(0.01)^{-2}$ 9) $\left(-\frac{\sqrt{2}}{2}\right)^{-4}$

2) Find the value of each of the following in simplest form:

1) $\left(\sqrt{3}\right)^{-2}$ 2) $\left(-\sqrt[3]{4}\right)^{-3}$ 3) $\left(\frac{1}{\sqrt{2}}\right)^{-3}$

4) $\left(\frac{\sqrt{3}}{3}\right)^{-5}$ 5) $\left(\sqrt{3}\right)^{-4} \times \left(-\sqrt{2}\right)^{4}$ 6) $\left(\frac{1}{\sqrt{3}}\right)^{5} \div \left(\frac{1}{\sqrt{3}}\right)^{7}$

3) Simplify:

1) $\left(\sqrt{2}\right)^{2} \times \left(\sqrt{2}\right)^{4}$ 2) $\left(-\sqrt{5}\right)^{9} \div \left(-\sqrt{5}\right)^{5}$

3) $\left(\sqrt{2}\right)^{4} \times \left(\sqrt{3}\right)^{4}$ 4) $\left(\left(\sqrt{3}\right)^{2} \times \left(-\sqrt{2}\right)^{3}\right)^{2}$

5) $\left(\frac{2\sqrt{2}}{3\sqrt{3}}\right)^{4}$ 6) $\frac{\left(\sqrt{3}\right)^{7} \times \left(\sqrt{3}\right)^{8}}{\left(\sqrt{3}\right)^{6}}$

4) Simplify each of the following in simplest form:

1) $\frac{\left(\sqrt{3}\right)^{-5} \times \left(\sqrt{3}\right)^{-4}}{\left(\sqrt{3}\right)^{-10}}$ 2) $\frac{(10)^{2} \times (10)^{-7}}{(0.1)^{2} \times 0.001}$

3) $\frac{\left(\sqrt{2}\right)^{5} \times (3)^{-2}}{3 \times \left(\sqrt{2}\right)^{9}}$ 4) $\frac{\left(\sqrt{3}\right)^{-3} \times \left(\sqrt{2}\right)^{-4}}{\left(\sqrt{2} \times \sqrt{3}\right)^{-5}}$

5) If X = 3 , Y = $\sqrt{2}$ find in the simplest form the value of each of the following:

a) $X^{-2}\ Y^{-4}$ b) $(X^{-2} \times Y^{4})^{-2}$ c) $\left(\frac{X}{Y}\right)^{-3}$

6) If X = $\frac{\sqrt{3}}{2}$, Y = $\frac{1}{\sqrt{3}}$, Z = $\frac{\sqrt{2}}{2}$. Find the value of: $X^2 + (XZ)^2 \times Y^2$

7) If X = 2 , Y = $\sqrt{3}$ find in the simplest form the value of :

i) $(X + Y)^4 (X - Y)^4$ ii) $\left(\frac{X+Y}{X-Y}\right)^{-2}$

8) If: a = $\frac{1}{\sqrt{2}}$, b = –1 find the value of $7a^6 + (1 - b)^{-3}$

9) If a = $\sqrt{3}$, b = $\sqrt{2}$ find the value of :

i) $a^4 - b^4$ ii) $\frac{a^4}{b^4}$

10) If X = $2\sqrt{2}$, Y = 3 find the value of: $(X^2 - Y^2)^3$

11) If: $\left(\sqrt{\frac{3}{2}}\right)^x = \frac{4}{9}$ find the value of $\left(\frac{2}{3}\right)^{x+1}$

12) If X = $\frac{\sqrt{3}}{2\sqrt{5}}$, Y = $\frac{1}{\sqrt{2}}$ prove that: $5X^2 + Y^4 = 1$

13) If X = $2\sqrt{3}$, Y = $\frac{4}{\sqrt{2}}$ prove that: $\sqrt{X^2 + Y^4 + 3} = 9$

14) Find the value of X in each of the following:

1) $2^x = 32$ 2) $2^{x-3} = 1$ 3) $3^{x-2} = 81$

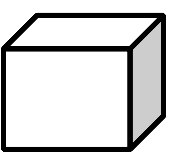
4) $(\sqrt{3})^{x-1} = 9$ 5) $3^{x-2} = \frac{1}{9}$ 6) $\left(\frac{2}{5}\right)^{2x-1} = \frac{8}{125}$

15) Prove that: $\frac{(27)^{x-1} \times 8^x}{(2\sqrt{2})^{2x} \times (3\sqrt{2})^{2x}} = \frac{1}{27}$

16) If $\frac{8^x \times 9^x}{(18)^x}$ = 64 find the value of $(4)^{-x}$

17) Simplify: $\frac{4^{x+1} \times 9^{2-x}}{6^{2x}}$ then calculate its value at x = 1

18) If the total area of a cube equals 3.375 × 10^2 unit area:



i) Find the length of the cube edge

ii) The volume of the cube

19) If V = $\frac{4}{3}\pi r^3$ is a rule volume of a sphere V of radius r, find radius of a sphere of volume = 3.8808 × 10^4 (consider $\pi = \frac{22}{7}$)

Probability

First: Complete:

1) If the probability that a student succeeds in a subject is 0.8, then the probability of his failure is ……………..

2) In an experiment of throwing a die once, the probability of getting a number 7 equals.

3) There are 21 boys and 15 girls in a classroom a student is chosen at random, then the probability that the student is a boy …………..

4) In an experiment of throwing a coin once the probability of appearance head equal the probability of appearance a tail then the probability of appearance head equals …………..

5) A bag contains 10 cards numbered from 1 to 10. A card is chosen at random then the probability that the number on this card is a prime number equals ……………

6) In an experiment of throwing a die, the probability of getting a number doesn't equal (2) is ……………………

7) If the probability that the student go to school on foot equals twice the probability that student go to school using transportation then the probability that the student go to school using transportation equals ……………..

8) A class has 40 students, 20 play football, 10 play basketball and 6 play volleyball, a student is chosen at random then the probability of chosen a student does not play any of the three sports ……………..

9) A factory produce 200 lamps every day if the probability that the lamp is defect is 0.03, then the number of the good lamps equals ……………..

10) A team played 30 matches; the probability that the team win is 0.5 and the probability of a drawn is 0.3 then the expected number of matches that the team losses is ……………..

11) A bag contains 10 apples, 5 red , 3 green and 2 yellow, one apple is chosen at random then the probability that apple is not red equals ……………..

12) If the probability of getting a certain result in a random experiment is 0.4 and if the experiment is carried 100 times, then the number of getting this result is ……………..

13) A teacher asked the pupils to draw a triangle if the probability of drawing a triangle according to their angles is equals then the probability of the drawing an obtuse triangle is ………….

Second: Choose the correct answer:

1) Which of the following may be equal the probability of an event

a) - 0.73 b) 1.23 c) 79% d) $\frac{4}{3}$

2) A die is thrown once then the probability appearance 5 on the upper face …………

a) $-\frac{5}{6}$ b) zero c) $\frac{1}{6}$ d) $\frac{5}{6}$

3) A coin is tossed 500 time, then the nearest expected number for appearance a head equals …………

a) 240 b) 252 c) 249 d) 260

4) A die is thrown then the probability of appearance number 7 is ……

a) zero b) $\frac{1}{7}$ c) $\frac{1}{6}$ d) 1

5) A die is thrown once, then the probability of appearance odd prime number is …………

a) zero b) $\frac{1}{6}$ c) $\frac{1}{3}$ d) $\frac{1}{2}$

6) If the probability that a student succeeds in a subject is 80%, then the probability of his failure is …………

a) 0.08 b) 0.02 c) 0.2 d) 0.8

7) In a race between two players if the probability that the first wines is 0.75 then the probability that the second wine is …………

a) zero b) 0.25 c) 0.75 d) 1

8) A bag contains 100 cards numbered from 1 to 100 then the probability that chosen of an even number = …………

a) 0.5 b) 1 c) zero d) 0.75





9) A class contains 15 boys, 20 girls, if a student is absent, then the probability that the absent student is a boy

a) $\frac{2}{7}$ b) $\frac{3}{7}$ c) $\frac{4}{7}$ d) $\frac{5}{7}$

10) A bag contains 10 balls 4 white balls, 5 red balls and the rest are black if a ball is drawn randomly then the probability of the drawn ball is black …………

a) 0.1 b) 0.2 c) 0.4 d) 0.5

11) If the probability that a student solve a problem is 0.7 then the expected number of problems he should solve from 20 problem is …………

a) 7 b) 10 c) 14 d) 20

12) A class contains 36 students, and the probability that a student of age less than 13 years is $\frac{1}{6}$ then the number of students of ages less than 13 years equals …………

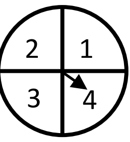
a) 20 b) 24 c) 30 d) 32

13) A class contains 50 students is chosen at random if the probability that the chosen student is a girl equals 0.4 then the number of boys equals …………

a) 50 b) 40 c) 30 d) 20

14) A box contains 2 white balls, 3 red balls and 5 black balls if a ball is drawn at random then the probability that the drawn ball is not red equals …………

a) 0.2 b) 0.3 c) 0.5 d) 0.7



15) The opposite figure a spinner game:

The probability that the pointer stop at a number is greater than 2

a) 25% b) 50% c) 75% d) 100%

16) In a mixed school, there are 900 students, a random sample formed from 150 students is selected it found that the number of girls equals 70 then the expected number of girls in the school equals

a) 400 b) 420 c) 480 d) 500

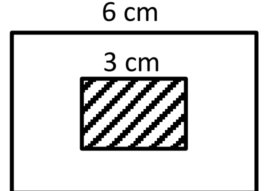
17) The probability that a player hits the target is 0.8 then the number of missing the target if the experiment is repeated 10 times

a) 8 b) 2 c) 1 d) zero

18) A box contains a balls colored red, green and blue if the box contains 15 blue balls and if the probability of drawn it is $\frac{1}{3}$ then the number of the balls in the box is ……………

a) 5 b) 15 c) 30 d) 45

19) A person shoot at a picture in the opposite figure then the probability of hitting the shaded part equals ………..



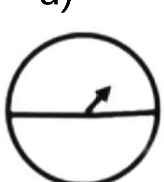
a) $\frac{1}{4}$ b) $\frac{1}{3}$ c) $\frac{1}{2}$ d) $\frac{3}{4}$

20) A spinner game is divided into two not equal parts X, Y the pointer rotate 200 times it stopped 47 times in part X which of the following shape indicated pointer to X

a) 

b) 

c) 

d) 

Third: Essay questions:

1) The following table shows the experiment of chosen a number from the numbers 2, 6 , 9 and the results as in the table

The number	2	6	9
Probability	0.3	0.5	X

i) Find the value of X.

ii) Calculate the probability of the chosen:

a) even number b) odd number c) prime number

2) A box contains 3 red balls, 4 yellow balls and 5 green balls a ball is drawn randomly find the probability of the drawn ball

a) yellow b) green c) not red

3) A die is thrown once find the probability of the following:

a) appearance of a prime number.

b) appearance of odd number.

c) appearance number zero.

d) appearance a number between zero and

4) A bag contains balls labeled by the numbers from 1 to 15 if a ball is drawn at random find the probability of each of the following:

a) carries an even number.

b) carries a number divisible by 3

c) carries prime number.

5) A set of cards number numbered from 1 to 24, a card is chosen randomly from this group find the probability of each of the following:

a) The drawn card carries number multiple of 6.

b) The drawn card carries a prime number.

c) The drawn card carries a complete perfect square number.

6) The following table shows the evaluation of 50 students:

Estimate	Excellent	Very	Good	Pass	Fail
Number	6	9	11	16	8

A student is chosen at random. Find the probability of the following:

a) Excellent b) Fail c) less than good

7) In the opposite figure represent a spinner game which its circle divided to 8 equals parts . Find the probability that the pointer stops at the part carry

a) An even number.

b) A prime number

c) A number not perfect square.

8) In producing 600 electric lamps 36 lamps were found defected if a lamp is drawn at random what the probability that the drawn lamp is:

a) defective b) not defective

9) The following table shows the results of a survey of a favorite transportation means to go to school:

Transportation	On foot	Private car	Bus	Bicycle
Number of students	66	12	3	19

A student selected randomly find the probability of choosing:

1) private car   2) on foot walker   3) a bicycle not used

10) The following table shows the all recording of 150 persons on communication office:

Calling time	Less than 3 min.	3 - 6 min.	6 - 9 min.	More than 9 min.
Number of persons	100	25	20	5

Find the probability that a person talk about:

a) less than 3 minutes   b) between 3 to 6 minutes

c) more than 9 minutes.   d) at least 3 min

11) A garment factory in the tenth of Ramadan city produce 6000 units daily as a sample of 100 units was examined, 20 defective units were found calculate the number of defective units.

12) A calculator manufacturing company examined randomly electronic circuits as a sample of 200 units the defective production was 6%

i) How many units are out of order in this sample.

ii) If the production in one month was 1500 units how many units are functional units of marketing.

13) In a fruit packing project 30% of fruits is not suitable for exporting because the size is too small how many tons can be exported in 10 days if 20 tons fruits are produced daily.

14) A bag contains 32 coloured balls of the same kind and the same volume, some of them are white, some are red, some are green, the rest are yellow, if the probability of drawn a red ball is $\frac{3}{8}$, how many red balls are there in this bag?

15) In a general league matches the probability that one team wins is 0.6, probability of a drawing is 0.3, if the team will play 30 matches, find the expected number of matches that the team losses.

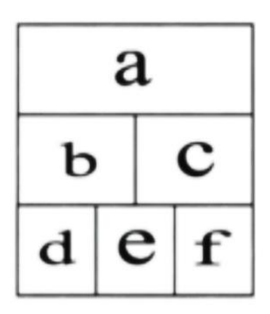
16) A box contains number of symmetrical cards, some of them are red and the other are blue, 5 pupils draw a card, register its colour, then return it to the box and all of them repeat the same work 14 times, then register the following results in the following table:

The pupils / the colour	First	Second	Third	Fourth	Fifth	Total
Red	10	6	2	14	10	42
Blue	4	8	12	0	4	28
Total	14	14	14	14	14	70

a) If a card is chosen randomly, find the probability that this card is blue.

b) Find the expected number of the red card if the number of all cards in the box is 100.

17) In the playing of target and arrow, if the target is a squared form and it is divided into the shown regions and the player was asked to shoot the arrow at the target without laying in a determined region.



a) Find the probability that the arrow hits region b.

b) Find the probability that the arrow hits the region which consists of b, c together.

18) The following table shows the evaluation of October for second form preparatory according to the scores of the students

Excellent	Very good	Good	Pass	Weak
6	9	12	6	3

a) Find the probability of getting a score of Good.

b) Find the expected number of students whose scores is Pass if the test is carried on 120 students.

Model Answers

Part (1)

(1) Complete the following:

1) $2a^2$, 6
2) 5 , $2X^2$, 7X
3) 5 , $3X^2$, 13X
4) X , 7XY , $6Y^2$
5) b , a , 7ab
6) 1 , 2
7) 2 , X + 4
8) 8 , 2 , X^2 , 2X
9) $(X + Y)^2$
10) 3 , $25a^2$, 9
11) (7X – 5Y) , 70XY
12) 7 , (11X + 7Y)
13) 9 , 7X , 7X
14) 1
15) 2a , 2ab , b^2
16) 12XY, 3Y , 2X
17) 2 , -2 , 14 , -14
18) 9
19) $\pm$ 220 X
20) 25
21) 7
22) -2
23) 1
24) 1
25) -19
26) $\pm$ 8X
27) -42
28) $(X + \frac{1}{X})^2 = 25$

$$X^2 + \frac{1}{x^2} = 25 - 2 = 23$$

29) $\frac{X^2}{4}$
30) X + 5
31) 1
32) Ø
33) $\pm$ 1
34) (X + L) (Y – Z)
35) X + 5
36) 3
37) $X^2 - 5X + 25$
38) 15

2) Choose the correct answer:-

1) 49
2) (X – 2) (X + 2)
3) $a^3 - 1$
4) 1
5) $\pm$ 24
6) 9
7) 9
8) 4
9) 3
10) 3
11) 4
12) 1
13) 16
14) 8
15) 4
16) 3
17) $X^3 - 8Y^3$
18) 4
19) 35
20) (X + Z) (Y + 3)
21) $\pm$ 5
22) 4
23) 14
24) $4X^2 + 6XY + 9Y^2$
25) – 3X
26) $\pm$ 6
27) 2
28) 6
29) 4
30) { 1 }
31) 5
32) 7
33) x – 3
34) $x^2 - y^2$
35) 25

3) Factorize each of the following:

1) (X – 8) (X + 1)
2) (Y – 7) (Y – 7)
3) (2Y + 5) (Y – 1)
4) (3X – 3) (X – 4)
5) (2X – 5) (2X – 5)
6) $(X^3 - 8)(X^3 - 1)$
7) $X(25X^2 - 10Y + Y^2)$

   $= X(5X - Y)(5X - Y)$
8) (XY – 25) (XY + 1)
9) $15a^2 - 19ab + 6b^2$

   $= (3a - 2b)(5a - 3b)$
10) (3X – 2Y) (2X – 3Y)
11) (5a – 1) (5a + 1)

12) $5XY\ (5X - 3 + 7)$

$5XY\ (5X + 4)$

13) $(4X^2 - 9)\ (4X^2 + 9)$

$= (2X - 3)\ (2X + 3)\ (4X^2 + 9)$

14) $(X + 4Y)\ (X^2 - 4XY + 16Y^2)$

15) $X^3 - 27$

$(X - 3)\ (X^2 + 3X + 9)$

16) $(\frac{X}{2} - \frac{Y}{7})\ (\frac{X}{2} + \frac{Y}{7})$

17) $3X^3\ Y^2\ (4Y^2 + X^2)$

18) $2X\ (4X^2 - Y^2)$

$= 2X\ (2X - Y)\ (2X + Y)$

19) $\frac{1}{8}\ XY\ (16Y^2 - X^2)$

$= \frac{1}{8}\ XY\ (4Y - X)\ (4Y + X)$

20) $2XY\ (X^2 - 4Y^2)$

$= 2XY\ (X - 2Y)\ (X + 2Y)$

21) $\frac{3}{4}\ X^3 - 48$ $\qquad$ $(X\ \frac{4}{3})$

$= X^3 - 64$

$= (X - 4)\ (X^2 - 4X + 16)$

22) $(0.3a - 0.1b)\ (0.09\ a^2 + 0.03ab + 0.01b^2)$

23) $(\ (a + b) + c)\ (\ (a + b)^2 - (a + b)\ c + c^2\ )$

24) $(a - 2b)\ (\ (a - 2b)^2 - 4\ )$

$= (a - 2b)\ (\ (a - 2b) - 2)\ (\ (a - 2b) + 2)$

25) $2\ (1 - (X - 1)^3)$

$2\ (1 - (X - 1)\ (X + X + 1)\ )$

26) $(Y^3 - Y^2) - (9Y - 9)$

$= Y^2 (Y - 1) - 9 (Y - 1)$

$= (Y^2 - 9) (Y - 1)$

$(Y + 3) (Y - 3) (Y - 1)$

27) $(a^3 - ab^2) - (a^2b - b^3)$

$= a (a^2 - b^2) - b (a^2 - b^2)$

$= (a - b) (a^2 - b^2)$

$= (a - b) (a - b) (a + b)$

28) $X^3 - 3X^2 - 6X + 8$

$= X^3 + 8 - 3X (X + 2)$

$= (X + 2) (X^2 - 2X + 4) - 3X (X + 2)$

$= (X + 2) (X^2 - 2X + 4 - 3X)$

$= (X + 2) (X^2 - 5X + 4)$

$= (X + 2) (X - 4) (X - 1)$

29) $(4X^2 - 4 XY + Y^2) - 16$

$= (2X - Y)^2 - 16$

$= (2X - Y - 4) (2X - Y + 4)$

30) $(3X^3 - 2X^2) + (12X - 8)$

$=X^2(3X - 2) + 4 (3X - 2)$

$= (X^2 + 4) (3X - 2)$

31) $25X^2 - 20X + 4 - 4X - 5$

$= 25X^2 - 24X - 1$

$= (25X + 1) (X - 1)$

32) $X^2 + X - 6 - 6X$

$= X^2 - 5X - 6$

$= (X - 6) (X + 1)$

33) $50 – 2 (4X^2 + 4X + 1)$

$= 2 (25 – (2X + 1)^2)$

$= 2 (5 – (2X + 1) (5 + (2X + 1))$

$= 2 (5 – 2X +1) (5 + 2X + 1)$

$= 2 (4 – 2X) (2X + 6)$

$= 8 (2 – X) (X + 3)$

34) $5Y^2 – 28 X1 – 12Y^2$

$= (5Y – 2X) (Y + 6X)$

<u>(4) Answer the following question:</u>

1) $(23.5 – 18.5) (23.5 + 18.5) = 5 x 22 = 110$

2) $2 [(26.18)^2 – (23.82)^2]$

$= 2 (26.18 – 23.82) (26.18 + 23.82) = 2 x 2.36 x 50 = 236$

3) $a^2 – 4b^2 + 5b^2$

$= a^2 + b^2$

4) $(X^2 – 9) (2X – 3) = (X – 3) (X + 3) (2X – 3)$

5) $(2a – b)^2 + (a + 2b) (a – b)$

$4a^2 – 4ab + b^2 + a^2 – ab + 2ab – 2b^2$

$= 5a^2 – 3ab – b^2$

$= 5X(1)^2 – 3 \times 1 \times 2 – (2)^2 = 5 – 6 – 4 = \boxed{-5}$

6) $(2X – 3Y)^2 + (3X – 1) (3X + 1)$

$4X^2 – 12XY + 9Y^2 + 9X^2 – 1$

$= 13X^2 – 12XY + 9Y^2 – 1$

7) $2a^2 + 4ab – 3ab – 6b^2 + a^2 – 2b^2$

$= 3a^2 + ab – 8b^2$

8) $4Y^2 + y – 14 = (Y + 2) (4Y – 7)$

9) $15a^2 + 17ab - 4b^2 = (3a + 4b)(5a - b)$

10) $(25 - 15)(25 + 15) = 40X$

$10 \times 40 = 40X$

$\boxed{X = 10}$

11) $a(X + Y) - 2b(X + Y) = (X + Y)(a - 2b)$

$= 7 \times 4 = 28$

12) $(X - Y)(X + Y)(X^4 - 2X^2Y^2 + Y^4)$

$(X^2 - Y^2)(X^2 - Y^2)^2 = (X^2 - Y^2)^3$

13) $(X + \frac{1}{x})^2 = 25$ $\qquad$ $X^2 + \frac{1}{x^2} = 23$

$X^2 + \frac{1}{x^2} + 2 = 25$

14) $(X + \frac{1}{x})^2 = X^2 + \frac{1}{x^2} + 2$

$= 34 + 2 = 36$

$\therefore X + \frac{1}{x} = \sqrt{36} = \boxed{6}$

(15) Find in R the S.S of the following equations:

a) $x^2 - 4x = 0$

$x(x - 4) = 0$

S.S = { 0 , 4 }

b) $(2x - 3)(2x + 3) = 0$

S.S = $\{\frac{3}{2}, -\frac{3}{2}\}$

c) $(4x^2 - 9)(4x^2 + 9)$

$(2x - 3)(2x + 3)(4x^2 + 9)$

S.S = $\{\frac{3}{2}, -\frac{3}{2}\}$





d) $(x - 4)(x + 3) = 0$

$S.S = \{4, -3\}$

e) $-(x + 1)^2 = -9$

$(x + 1)^2 = 9$

$x + 1 = 3$

$x + 1 - 3 = 0 \quad \rightarrow \quad x - 2 = 0$

$S.S = \{2\}$

f) $-(x + 3)(x - 2) = 0$

$S.S = \{-3, 2\}$

g) $(4x - 1)(x + 3) - (x + 5)^2 + 4 = 0$

$4x^2 + 12x - x - 3 - (x^2 + 10x + 25) + 4 = 0$

$4x^2 + 12x - x - 3 - x^2 - 10x - 25 + 4 = 0$

$3x^2 + x - 24 = 0$

$(3x - 8)(x + 3) = 0$

$S.S = \{\frac{8}{3}, -3\}$

h) $x^2 - x = 56$

$x^2 - x - 56 = 0$

$(x + 7)(x - 8) = 0$

$S.S = \{-7, 8\}$

k) $x^2 - 2x + 1 = 0$

$(x - 1)(x - 1) = 0$

$S.S = \{1\}$

Part (2)

(1) Answer the following questions:

1)

2) A. of rectangle = $(x + 1)(x + 5) = x^2 + 6x + 5$

P. of rectangle = $[x + 1 + x + 5] \times 2 = [2x + 6] \times 2$

$= 4x + 12$

3) A. of square = $(5a + b)(5a + b)$

$= 25a^2 + 10ab + b^2$

$= 25 \times 2^2 + 10 \times 2 \times 3 + 3^2$

$= 100 + 60 + 9 = 169$

4) Let the two number be s , x + 2

$x^2 + (x + 2)^2 = 100$

$x^2 + x^2 + 4x + 4 = 100$

$x^2 + 2x + 2 = 100 \div 2 = 50$

$x^2 + 2x + 2 - 50 = 0$

$x^2 + 2x - 48 = 0$

$(x - 8)(x + 6) = 0$

$x = 8$ or $x = -6$ refused

$\therefore x = \boxed{8}$, $x + 2 = \boxed{10}$

5) Let width be x and length x + 3

$A = x(x + 3) = 28$

$x^2 + 3x = 28$

$x^2 + 3x - 28 = 0$

$(x + 7)(x - 4) = 0$

$x = -7$ refused or $x = 4$

$\therefore$ width = 4 cm

length = 4 + 3 = 7 cm

6) Let the number be 2x , 3x

$(2x)(3x) - 2(3x) = 12$

$6x^2 - 6x = 12$

$6x^2 - 6x - 12 = 0$

$6(x^2 - x - 2) = 0$

$x^2 - x - 2 = 0$

$(x - 2)(x + 1) = 0$

$x = 2$, $x = -1$ refused

$\therefore L = 3x = 3 \times 2 = 6$ cm

$w = 2x = 2 \times 2 = 4$ cm

7) as no. (5)

8) A. of square = x^2

A. of rectangle = 2x

$x^2 + 2x = 15$

$x^2 + 2x - 15 = 0$

$x = -5$ refused or $x = 3$

$\therefore$ P. of square = 5 × 4 = 12 cm

(2) Complete:

1) $\frac{1}{2\sqrt{2}}$	2) 5	3) $\frac{9}{4}$
4) 2	5) 4	6) 8
7) $\left(-\sqrt{11}\right)^{24}$	8) zero	9) 1
10) 20	11) 1	12) –1
13) $1 + x^2$	14) 1	15) 2

16) $2^{-5} \div (2^2)^{-3} = 2^{-5} \div 2^{-5} = 2^{zero} = \boxed{1}$

17) $3^{-6} \div 3^{-6} \times (-2)^{-1} = 1 \times -\frac{1}{2} = -\frac{1}{2}$

18) $(2)^7 \div 1 = 2^7$

19) $3 \times 3^x = 1$

$3^{x+1} = 3^0$ then $x = -1$

20) $\frac{2^x \times 3^x}{2^{2x} \times 3^x} = 2^{x-2x} = 2^{-1}$

$-x = -1 \rightarrow \boxed{x = 1}$

(3) Choose:

1) c	2) a	3) c	4) c	5) c
6) a	7) b	8) d	9) a	10) d
11) c	12) b	13) c	14) a	15) a
16) a	17) a	18) b	19) c	20) d
21) a				





(3) Answer the following question:

(1) 1) $\frac{1}{3}$ 2) 4 3) $\frac{8}{27}$ 4) 25 5) $\frac{1}{9}$

6) $\frac{1}{7}$ 7) $\frac{1}{8}$ 8) $\frac{1}{0.0001}$ 9) $\frac{16}{4}$ = 4

(2) 1) $\frac{1}{9}$ 2) $-\frac{1}{4}$ 3) $2\sqrt{2}$

4) $\left(\frac{3}{\sqrt{3}}\right)^5 = \frac{243}{9\sqrt{3}} = \frac{27}{\sqrt{3}}$ 5) $\frac{4}{9}$ 6) 9

(3) Simplify:

1) $(\sqrt{2})^6 = 2^3 = 8$ 2) $(-\sqrt{5})^4 = 5^2 = 25$

3) 4 × 9 4) $(3)^2 \times (-2\sqrt{2})^2 = 9 \times 8 = 72$

5) $\frac{16 \times 4}{81 \times 9} = \frac{64}{729}$ 6) $\frac{(\sqrt{3})^{15}}{(\sqrt{3})^6} = (\sqrt{3})^9 = 81\sqrt{3}$

(4) Simplify each of the following in simplest form:

1) $\frac{(\sqrt{3})^{-9}}{(\sqrt{3})^{-10}} = \sqrt{3}$

2) $\frac{(10)^{-5}}{(0.1)^2 \times (0.1)^3} = \frac{(10)^{-5}}{(0.1)^5}$

$= (10)^{-5} \times (10)^5 = (10)^{zero} = 1$

3) $(\sqrt{2})^{-4} \times (3)^{-3} = \frac{1}{4 \times 27} = \frac{1}{108}$

4) $(\sqrt{3})^2 \times (\sqrt{2})^1 = 9\sqrt{2}$

(5) a) $(3)^{-2} \times (\sqrt{2})^{-4} = \frac{1}{9 \times 4} = \frac{1}{36}$

b) $\left((3)^{-2} \times (\sqrt{2})^4\right)^{-2} = (3)^4 \times (\sqrt{2})^{-8} = \frac{81}{16}$

c) $\left(\frac{3}{\sqrt{2}}\right)^{-3} = \left(\frac{\sqrt{2}}{3}\right)^3 = \frac{2\sqrt{2}}{27}$

(6) $\left(\frac{\sqrt{3}}{2}\right)^2 + \frac{\sqrt{3}}{2} \times \frac{\sqrt{2}}{2} \times \left(\frac{1}{\sqrt{3}}\right)^2$

$\frac{3}{4} + \frac{\sqrt{6}}{12} = \frac{9+\sqrt{6}}{12}$

(7) i) $\left(2+\sqrt{3}\right)^4 \left(2-\sqrt{3}\right)^4$

$\left[\left(2+\sqrt{3}\right)\left(2-\sqrt{3}\right)\right]^4 = [4-3]^4 = 1$

ii) $\left(\frac{2+\sqrt{3}}{2-\sqrt{3}}\right)^{-2}$

$= \frac{\left(2-\sqrt{3}\right)^2}{\left(2+\sqrt{3}\right)^2} = \frac{4-2\sqrt{3}+3}{4+2\sqrt{3}+3} = \frac{7-2\sqrt{3}}{7+2\sqrt{3}}$

(8) $7 \times \left(\frac{1}{\sqrt{2}}\right)^6 + (1+1)^{-3}$

$\frac{7}{8} + \frac{1}{8} = \frac{8}{8} = 1$

(9) i) $\left(\sqrt{3}\right)^4 - \left(\sqrt{2}\right)^4 = 9 - 4 = 5$

ii) $\frac{\left(\sqrt{3}\right)^4}{\left(\sqrt{2}\right)^4} = \frac{9}{4}$

(10) $\left(\left(2\sqrt{2}\right)^2 - (3)^2\right)^3$

$(8-9)^3 = -1$

(11) $\left(\frac{\sqrt{3}}{\sqrt{2}}\right)^x = \left(\frac{\sqrt{3}}{\sqrt{2}}\right)^{-4}$

$\left(\frac{2}{3}\right)^{x+1} = \left(\frac{2}{3}\right)^{-4+1} = \left(\frac{2}{3}\right)^{-3} = \frac{27}{8}$

(12) $5\left(\frac{\sqrt{3}}{2\sqrt{5}}\right)^2 + \left(\frac{1}{\sqrt{2}}\right)^4$

$= 5 \times \frac{3}{20} + \frac{1}{4}$

$\frac{3}{4} + \frac{1}{4} = \frac{4}{4} = 1$

(13) $\sqrt{(2\sqrt{3})^2 + \left(\frac{4}{\sqrt{2}}\right)^4 + 3}$

$= \sqrt{12 + 64 + 3} = \sqrt{79}$

(14) Find the value of X in each of the following:

1) x = 5	2) x = 3	3) x = 6
4) x = 5	5) x = 0	6) x = 2

(15) $\frac{(3^3)^{x-1} \times (2^3)^x}{2^{2x} \times (\sqrt{2})^{2x} \times 3^{2x} \times (\sqrt{2})^{2x}}$

$= \frac{3^{3x-3} \times 2^{3x}}{2^{2x} \times 2^x \times 3^{2x} \times 2^x}$

$= 3^{3x-3-2x} \times 2^{3x-2x-x-x}$

$= 3^{x-3} \times 2^{-x}$

(16) $\frac{2^{3x} \times 3^{2x}}{2^x \times 3^{2x}} = 64$

$= 2^{3x-x} \times 3^0$

$= 2^{2x} = 2^6$

$= \boxed{x = 3} \rightarrow \quad 4^{-x} = 4^{-3} = \frac{1}{64}$

(17) $\frac{(2^2)^{x+1} \times (3^2)^{2-x}}{2^{2x} \times 3^{2x}}$

$= 2^{2x+2-2x} \times 3^{4-2x-2x}$

$= 2^2 \times 3^{4-4x} = 4 \times 3^{4-4} = \boxed{4}$

(18) The total area of cube = $\ell^2 \times 6 = 3.375 \times 10^2$

$\ell = \sqrt{3.375 \times 10^2 \div 6} = 7.5$ cm

The volume = $\ell^3 = (7.5)^3 = 421.9$ cm^3

(19) $v = \frac{4}{3} \times \frac{22}{7} \times r^3 = 3.8808 \times 10^4$

$r^3 = 3.8808 \times 10^4 \times \frac{3}{4} \times \frac{7}{22}$

$r = \sqrt{9.261} = 3.04$ cm

Probability

First: Complete:

1) $\frac{2}{10} = \frac{1}{5}$	2) zero	3) $\frac{21}{36}$	4) $\frac{1}{2}$
5) $\frac{2}{5}$	6) $\frac{5}{6}$	7) $\frac{1}{3}$	8) $\frac{1}{10}$
9) 14 lamps	10) 6	11) $\frac{1}{2}$	12) 40
13) zero			

Second: Choose the correct answer:

1) c	2) d	3) c
4) a	5) c	6) c
7) b	8) a	9) b
10) a	11) c	12) b
13) c	14) d	15) a
16) b	17) b	18) d
19) c	20) c	

Third:

(1) i) 0.2 ii) a) 0.8 b) 0.2 c) 0.3

(2) a) $\frac{4}{12} = \frac{1}{3}$ b) $\frac{5}{12}$ c) $\frac{9}{12} = \frac{3}{4}$

(3) a) $\frac{1}{2}$ b) $\frac{1}{2}$ c) zero

(4) a) $\frac{7}{15}$ b) $\frac{3}{15} = \frac{1}{5}$ c) $\frac{6}{15}$

(5) a) $\frac{4}{24} = \frac{1}{6}$ b) $\frac{9}{24} = \frac{3}{8}$ c) $\frac{3}{24} = \frac{1}{8}$

(6) a) $\frac{6}{50} = \frac{3}{25}$ b) $\frac{8}{50} = \frac{4}{25}$ c) $\frac{24}{50} = \frac{12}{25}$

(7) a) $\frac{1}{2}$ b) $\frac{4}{8} = \frac{1}{2}$ c) $\frac{7}{8}$

(8) a) $\frac{36}{600} = \frac{6}{100} = \frac{3}{50}$

b) $\frac{64}{600} = \frac{2}{25}$

(9) 1) $\frac{12}{100} = \frac{6}{50}$ 2) $\frac{66}{100} = \frac{33}{50}$ 3) $\frac{81}{100}$

(10) a) $\frac{1}{2}$ b) $\frac{25}{200} = \frac{1}{8}$ c) $\frac{5}{200} = \frac{1}{40}$ d) $\frac{100}{200} = \frac{1}{2}$

(12) i) 12 ii) 1400

(13) Number of tons daily = $\frac{70}{10} \times 20$ = 14 ton

Number of tons in 10 days = 14 × 10 = 140 ton

(14) Number of red balls = $\frac{3}{8} \times 32$ = 12 ball

(15) $\frac{1}{10} \times 30$ = 3 match

(16) a) $\frac{14}{35} = \frac{2}{5}$ b) $\frac{3}{5} \times 100 = 60$

(17) a) $\frac{1}{6}$ b) $\frac{2}{6} = \frac{1}{3}$

(18) a) $\frac{12}{36} = \frac{1}{3}$ b) $\frac{1}{6} \times 120 = 20$ students